Trends in food industry structure in Denmark

Consolidation, concentration, value added and exports

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Institute of Food and Resource Economics

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Preface

Interest in the Danish food marketing chain has prompted a number of recent research projects at the Institute of Food and Resource Economics. This report summarises existing data on industry structure, value added and sales at three stages of the Danish food marketing chain: processing, wholesale and retail. It is a part of the project "Perspektiver for og udvikling af den danske fødevarekæde (phase 2)" which is funded by the Innovationslov and administered by the Food Economy Directorate of the Danish Ministry of Agriculture (DFFE). Research Director Mogens Lund commented on draft versions of the report.

Director General Søren E. Frandsen
Institute of Food and Resource Economics
Copenhagen, February 2008

Summary

This report presents summary data for structural development in the Danish food industry for the period up to 2003, being the most recent available data at the time of writing. Based on data provided under licence by *Statistics Denmark* (six-digit NACE or DB03 series), structure is examined for 24 food processing, 13 food wholesale and 14 food retail industries, covering specialised and unspecialised industries in commodity terms. The data refer to 1995-2003 for the food processors and retailers, and 1998-2003 for wholesale and distribution. Regarding numbers of firms, a break in the data occurs at 1998/1999 due to changed variable definitions.

Across the entire food industry, consolidation is widely observed. It averaged (in terms of change in the number of firms) -11% for food processing industries, -9% for food wholesale industries and -5% for food retailing industries between 1999 and 2003. The consolidation took place in the context of sales that were almost static for most food processing and retail industries, so that it was associated with increases in average sales per firm. There is a significant correlation across industries between consolidation and changes in sales per firm. In food retailing, there is evidence of two substantial re-alignments of industries: an emerging dominance of non-specialised food retailers at the expense of specialists; and the expansion of supermarket sales at the expense of grocery stores and other non-specialists.

In 2003, concentration is extreme in most food processing industries. This applies to the standard measure of concentration (CR_4) as well as cruder measures of shares of sales and input purchases, and exports. For most food processing industries, value added is also dominated by the largest four firms. Concentration in food wholesale sales is a more mixed picture in 2003: its average CR_4 is about the same as for food processing but cruder measures reveal far less dominance for the largest firms than is the case for food processing. Concentration in wholesale value added is less pronounced than for food processing and is not so strongly correlated with market share. For most measures of concentration in almost all industries studied, it is apparent that the firms ranked fifth to eighth have little market share. This indicates the importance of a few large firms in almost all Danish food industries.

Concentration in food retail, in this report, refers to industries rather than food products and markets. The supermarket and grocery store industries are the most concentrated in 2003 in terms of sales and input purchases. Notably, the share of supermarket value added held by the top four firms is below the corresponding market share,

and the same is true for many of the specialised food retail industries. This indicates the persistence of a set of high-value-provision firms alongside a set of firms focused on high volume.

Aggregate real value added rose in the period studied for the great majority of food processing industries, with aggregate food processing value added rising by 20% in the period 1995-2003. The shares of aggregate food processing value added re-aligned to some extent in the period 1995-2003. The share of value added held by the pork processing industry fell from 23.8% to 21% of aggregate food processing value added.

At the wholesale stage, real aggregate value added was largely unchanged for the period 1998-2003. However, some substantial changes in industry-level shares of value added occurred: meat and meat products' wholesale share of aggregate value added fell from 14.8% to 11.9% while the share of wholesale of dairy, eggs and fats rose from 8.5% to 10.6%. The shares of value added held by commodity-specialised wholesalers was steady for the period studied, and that held by non-specialised wholesalers changed little.

Real aggregate value added in food retailing increased just 13% from 14.7 to 16.7 billion DKK in the period 1995-2003. Both grocers' shops and supermarkets showed a significant and steady increase in value added over time, but the trend for most retail industries has been downward. In terms of shares, the supermarket industry has abruptly risen to prominence as its share of aggregate food retail value added rose from 27.6 to 41.2% between 1995 and 2003.

Most trends identified in the report are gradual in nature. In several cases the data indicate extreme swings which must be treated with caution. A general observation is that several of the perceived structural changes occurred up to the year 2000, with rather less pronounced changes between that year and 2003. Adjustments in the meat and dairy sectors, and across most food wholesale industries, are exceptions in that consolidation and concentration continue up until 2003.

Crude measures of concentration in exports indicate the absolute dominance of the largest firms across most food industries. Similarly, sourcing of raw materials is highly concentrated amongst the largest firms. The future for small and medium-sized food industry firms is therefore questionable, and this topic dominates policy recommendations.

1. Introduction

1.1. Purpose

The current paper utilises a comprehensive database of Danish food industry firms for the years 1995-2003. Its purpose is:

- to report changes in food industry and food supply chain structure over the period;
- to report associated developments in consolidation, concentration and value added; and
- to draw conclusions relevant to the future development of the Danish food industry.

1.2. The "Food Chain Project"

This research is conducted under the auspices of the project[1] known as "Perspektiver for og Udvikling af den danske fødevarekæde (phase 2)"[2] commonly known as "the Food Chain Project". This project is funded under the Innovationslov and administered by the Food Economy Directorate of the Danish Ministry of Agriculture (DFFE). The objectives of the project are to:

- measure changes in function, structure and commercial practice in the Danish food industry and compare and contrast these with developments in other countries;
- characterise vertical and horizontal relationships in the Danish food chain and their role in delivering optimal levels of food quality, variety and safety;
- evaluate the efficiency and competitiveness of the Danish food system at each stage of the marketing chain;
- review and evaluate instruments of Danish, EU and foreign public policy in the development of the food marketing chain; and
- communicate research results in a number of media.

The current report seeks to identify and communicate changes in food industry structure and performance.

[1] Further information about the project are available from the authors at **db@foi.dk**.
[2] "Perspectives and outlook for the Danish food marketing chain"

1.3. Motivation for the study

1.3.1. Motivation for food industry dynamics

Several authors have observed that that food industry firms' actions and strategies reflect the lack of volumetric growth in food sales in the industrialised world. Marsden et al. (1998) attribute this to the accumulation of market power in the food supply chain. Meulenberg's and Vianne's (2002) view is that firms address static sales by adding progressively more value per unit of sales, perhaps by quality improvement or, alternatively, by exploiting opportunities for cost reductions (Morrison Paul, 2001). Whatever the technical method of raising value added, Price (2002) and Hughes (2002) both interpret channel development as a means of achieving it. Many authors (e.g. Cotterill, 1997) have described mechanisms by which channel development has enabled the exercise of market power in the food industry. The current study provides information for researchers, policy makers and food industry firms on the latest available measures of industry development and structural change.

1.3.2. Consolidation and concentration

Baker (2003) reports that numbers of Danish food industry firms fell substantially between 1995 and 2000 at all stages of the chain and across many industries, and that these changes were more pronounced in Denmark, and apparent in more food industries, than elsewhere in Europe. Festerling (2005) reports that the downward trend in the number of Danish food industry firms continued after 2000, although less dramatically: a few industries, mainly within the processing sector, experienced a small increase in the number of firms.

Baker's (2003) summary of the available literature for the period around 2000 included an average food processing (all industries) 3-firm concentration ratio of 69% in Denmark. From another study, Baker reports CR_3 at 72.1% for meat processing, 88.4% for dairy and ice cream manufacture, 71.3% for brewing and just 12.6% for "other food processing". For food retailing, he reports a CR_5 of 59.5% for Denmark and substantial buying power. The current study uses available data to calculate measures of concentration (both in standard and intuitive ways), that address all three stages of the food marketing chain as well as considering input markets. In addition, concentration of export sales is reported.

1.3.3. Sales

From the mid-1990s onwards, Baker (2003) and Festerling (2005) report slight increases in food processors' sales, a significant increase for food wholesale sales, and a mixed picture for food retail whereby specialised stores reduced sales and unspecialised ones, particularly supermarkets, increased sales. The current report examines whether that trend has continued or stabilised.

1.3.4. Value addition

Baker's results for value addition in the Danish food industry in the period 1995-2000 present a general increase for food processors, a decline for wholesalers and a decline for retailers with the exception of supermarkets. The current paper provides results from a longer time series, and across a broader range of industries, than the earlier work.

Rogers (2001) reports on US trends in seller concentration in the food processing industry and their association with the allocation of value added amongst the same firms. He finds that value added is highly "concentrated" amongst the firms with the largest sales. This report examines this tendency in the Danish food industry, at all three stages and of the food marketing chain, across all industries comprising each stage.

1.4. Outline of report

Section 2 details the database and methods used, and provides some definitions and guidance on interpretation. Sections 3-10 examine in turn: numbers of firms (section 3), sales and sales per firm (section 4), value added (section 5), CR_4 and CR_8 (section 6), sales concentration in terms of shares of sales (section 7), concentration in terms of raw materials purchases (section 8), the allocation of value added amongst firms (section 9) and the concentration of food industry export sales (section 10). Section 11 is a summary of the results and section 12 presents conclusions and discusses them in the context of food industry development and suggestions for future research.

Sections 3-10 follow a sequence of processing, wholesaling, retailing. In each case tables of data are followed by time-plots of variables over the period 1995-2003 (and 1998-2003 for food wholesale).

2. Data and method

2.1. Database used

The principal data source for this study is provided under licence by *Statistics Denmark*. It is a panel data set listing firm-level[3] data from the annual industry accounts statistics[4] for the years up to 2003 for the food processing (six-digit NACE or DB03 code 510000 series), retail (NACE 521000 (unspecialised) and 522000 (specialised) series: see table 2.1-2.3), and wholesale and distribution (NACE 151000-158000 series) industries. The data refer to 1995-2003 for the food processing and retail sectors, and 1998-2003 for wholesale and distribution.

A second data source is the VAT Statistics, which are used for their specification of exports and imports. Similarly to that described above, this is a panel dataset for food industry firms for the years 1995-2003. It is also provided under licence by *Statistics Denmark*. These data are used in estimation of market size variables by adjusting for international trade. Firms included in the database include only those that have paid wages and salaries for at least 0.5 man-years in each year and/or have specified sales,[5] although this specification was changed after 1998 (see below).

[3] Data at firm level are confidential, but summaries and aggregated data are available free of charge at http://www.statbank.dk/statbank5a/default.asp?w=1024
[4] *Regnskabsstatistik*
[5] Exceptions occur where firms commenced operations in a given year.

Table 2.1. Industrial classifications and names: Food Processing

DB03	Name	Changes
151110	Production, processing and preserving of pork	
151120	Production, processing and preserving of beef	
151130	Offal dressing factories	Deleted
151140	Processing of animal offal and production of bone meals	Deleted
151200	Production, processing and preserving of poultry meat	
151310	Production of prepared meat dishes	
151390	Other production, processing and preserving of meat products	
152010	Production, processing and filleting of fish and fish products	
152020	Smoking and salting of fish	
152030	Production of bone fishmeal	Deleted
153100	Processing and preserving of potatoes	
153200	Manufacture of fruit and vegetable juice	Deleted
153300	Processing and preserving of fruit and vegetables n.e.c.	
154100	Manufacture of crude oils and fats	Deleted
154200	Manufacture of refined oils and fats	Deleted
154300	Manufacture of margarine and similar edible fats	
155110	Operation of dairies and cheese making	
155120	Manufacture of condensed milk	Deleted
155200	Manufacture of ice cream	
156100	Manufacture of grain mill products	Divided: 156110 & 156120 in 2003
156110	Manufacture of grain mill products	Now 156100
156120	Industrial manufacturing and processing of seeds	Now 156100
156200	Manufacture of starches and starch products	
157110	Manufacture of prepared feeds for agriculture and fur farming	
157120	Manufacture of prepared feeds for fish hatcheries	Deleted
157200	Manufacture of prepared pet feeds	
158110	Manufacture of bread and other bakery products	
158120	Bakers' shops	
158200	Mfr.e of rusks and biscuits; preserved pastry goods and cakes	
158300	Manufacture of sugar	Deleted
158400	Manufacture of cocoa, chocolate and sugar confectionery	
158500	Mfr. of macaroni, noodles, couscous & similar farinaceous prod.	Deleted
158600	Processing of tea and coffee	Deleted
158700	Manufacture of condiments and seasonings	
158800	Mfr. of homogenised food preparations and dietetic food	Deleted
158900	Manufacture of other food products n.e.c.	Divided: 158910 & 158920 in 2003
158910	Manufacture of dietary supplements	Now 158900
158920	Manufacture of other food products n.e.c.	Now 158900
159100	Manufacture of distilled potable alcoholic beverages	Deleted
159200	Production of ethyl alcohol from fermented materials	
159300	Manufacture of wines	Deleted
159400	Manufacture of cider and other fruit wines	Deleted
159500	Manufacture of other non-distilled fermented beverages	
159600	Manufacture of beer	
159700	Manufacture of malt	Deleted
159800	Production of mineral waters and soft drinks	

Table 2.2. Industrial classifications and names: Wholesale

DB03	Name	Changes
513100	Wholesale of fruit and vegetables	
513200	Wholesale of meat and meat products	
513300	Wholesale of dairy produce, eggs and edible oils and fats	
513410	Wholesale of beer and soft drinks	
513420	Wholesale of wine and spirits	
513490	Wholesale of fruit and vegetable juice etc.	
513500	Wholesale of tobacco products	
513600	Wholesale of sugar, chocolate and sugar confectionery	
513600	Ws. of bread, cakes, sugar, chocolate and sugar confectionery	Renamed in 2003
513700	Wholesale of coffee, tea, cocoa and spices	
513810	Wholesale of fish and products thereof	
513820	Wholesale of bread, cakes and biscuits	Now 513600
513830	Wholesale of health food products	
513890	Other specialized wholesale of food, beverages and tobacco	
513900	Non-specialized wholesale of food, beverages and tobacco	

Table 2.3. Industrial classifications and names: Food Retail

DB03	Name	Changes
521110	Grocer's shops	Divided: 521110 & 521140 in 2003
521120	All-night shops	
521130	Supermarkets	
521140	Discount stores	Now 521110
521210	Variety stores	
521220	Department stores	Deleted
522100	Retail sale of fruit and vegetables	
522200	Retail sale of meat and meat products	
522300	Retail sale of fish, game, crustaceans and molluscs	
522410	Retail sale of bread, cakes and flour confectionery	
522420	Retail sale of chocolate and sugar confectionery	
522500	Retail sale of alcoholic and other beverages	
522600	Retail sale of tobacco products	
522710	Retail sale of cheese	
522730	Retail sale of health food	
522790	Other retail sale of food and beverages in specialized stores	

2.2. Treatment of inflation

Deflation of current financial values employs *Statistics Denmark's* net price indices. At retail level, this tracks the development of prices (less indirect taxes and duties and including price subsidies) charged to consumers for goods and services bought by private households in Denmark (2000=100). The database employs 25,000 prices collected from approx. 1,800 shops, companies and institutions throughout Denmark.

Sub-series[6] exist for retail, processing and distribution sectors, and the industrial index was used for certain industries (see table 2.4).

Table 2.4. Deflation index

Index	1995	1996	1997	1998	1999	2000	2001	2002	2003
Net	0,9045	0,9197	0,9526	0,9697	0,9756	1,0000	1,0344	1,0578	1,0795
Industrial	0,9618	0,9788	1,0078	0,9751	0,9579	1,0002	1,0523	1,0518	1,0343

2.3. Definitions and calculation of key indices

2.3.1. Numbers of firms

The number of firms has been accessed from the annual industry account statistics. For this series, the lower size bound for firms' inclusion was changed in 1999, which falls in the middle of the period summarized in this report. Up to 1998, all firms with paid employment or an annual turnover of at least DKK 20 thousand have been listed in the statistics. From 1999 on, however, the lower bound was raised to include only firms with at least 0.5 full-time labour units or an annual industry-specific minimum profit. The industry-specific calculation of the necessary minimum profit is related to the firms' typical annual turnover. For processing industries, the boundary lies at DKK 150 to 200 thousand annual turnover whereas for wholesale firms it lies at approximately DKK 300 thousand annual turnover. Despite the obvious requirement to indicate the data break in reported numbers of firms, it has minimal impact on results presented in the current report because economic variables include the excluded firms, which in any case contribute small shares of the aggregate. Finally, data on numbers of firms for food industries comprising less than 5 firms are excluded for purposes of confidentiality.

[6] Retail: Output variables: PRIS7: Sub-index: "Food-, drink-, and tobacco industry". Input variables: BRPRIS01, sub-index: ”Food-, drink-, and tobacco industry”. Wholesale: Output variables: BRPRIS01, sub-index: ”Food-, drink-, and tobacco industry”. Input variable: BRPRIS01, sub-index: ”Food-, drink-, and tobacco industry”. Processing: Output variables: BRPRIS01, sub-index: 6”Food-, drink-, and tobacco industry”. Input variables: PRIS10, sub-index: ”raw materials”. (råvarer til øvrige erhverv”).

2.3.2. Sales

Sales are expressed in 1000 DKK at current prices. Industries with less than 5 firms are not shown (see above), but the totals recorded include the missing firms. For this study, sales data are deflated as above.

2.3.3. Value added

Following the standard definition of *Statistics Denmark*, value added in this study is defined as *turnover plus other operating income minus consumption of goods and services*. In terms of Table A1 (see appendix) turnover plus other operating income is composed of the sum of OMS, AUER, ADR and DLG. The composition of consumption of good and services is given by the sum of KRH, KENE, KLOE, UDHL, UASI, SEUD and (i) OEEU for the sub-period 1995 to 1998, (ii) ANEU + UDVB + ULOL for the sub-period 1999 to 2001 and finally, (iii) EKUD + UDVB + ULOL for the remaining sub-period 2001 to 2003.[7]

2.3.4. CR_4 and CR_8

The concentration index calculated by *Statistics Denmark* is based on the dutiable domestic sales specified in the annual VAT tax statistics (*momsstatistikken*) compiled and used by *Statistics Denmark*. The sales are specified in current prices excluding VAT but including duty and specific taxes (*punktafgifter*).

The calculation of the *k*-firm concentration ratio follows the Danish Competition Authority's calculation method as presented in Konkurrencestyrelsen (2001). The index is based on the instalment index measuring the aggregated market share of the largest firms in an industry. The concentration index is defined as:

$$CR_k = s_1 + s_2 + ... + s_k = \sum_{i=1}^{k} s_i$$

where s_i is a single firm's market share relative to the aggregate market sales and k is the number of firms in the index. In this report, and by convention, $k = 4$ and $k = 8$ receive the most attention. To arrive at a meaningful measure, the concept of "market

[7] In fact, *Statistics Denmark* subtracts 0.0079*TGT from turnover during the sub-period 1999 to 2001 in order to take into account that OTDE – which does not enter the calculation of value added - has not been handled as an independent balance sheet item during this period. TGT refers to receivable debts and is used as a proxy for OTDE. This correction has been omitted in this study.

share” *s* needs adjustment to address exports (which would overstate exporting firms’ shares of the domestic market) and imports (which reduce all domestic firms’ market shares). Shares are then redefined to exclude exports such that

$$s_i = \frac{domestic\ sales\ by\ firm\ i}{total\ industry\ sales}$$

To take account of imported goods, the “adjusted” concentration index is calculated relative to the aggregate supply of goods to the Danish market. The market share of the largest four firms is thus reduced by including the imports in the total domestic sales. The adjusted concentration index is calculated using import quotas:

$$CR_k(adj) = CR_k(1 - \%\ import\ quota).$$

2.3.5. Other concentration measures

In this study additional measures of concentration are used. These include the share of sales held by the top 4 or 8 firms (ignoring imports and exports), the share of purchases of raw materials held by the top 4 or 8 firms (ignoring imports and exports), and the share of exports sold by the 4 or 8 largest exporting firms. Concentration in value added is calculated as the share of value added accruing to the top 4 or 8 firms ranked by value added.

3. Numbers of firms

3.1. Processing

The Danish food processing sector features small numbers of firms in each industry (table 3.1) with just a few sectors boasting over 50 firms. Bakeries are the only industry in which a large number of firms is observed, albeit with a 9% decline between 1995 and 1998 and a 14% decline 1999-2003. In most NACE six-figure food processing industries the number of firms has fallen significantly over both continuous periods 1995-1998 and 1999-2003 (table 3.1). Condiments and seasonings is one of the few food processing industries to have seen a small increase in the number of firms over the period studied.

Table 3.1. Number of firms: processing

Industry	1995	1996	1997	1998	DATA BREAK	1999	2000	2001	2002	2003
Production, processing and preserving of pork	37	34	32	32		30	27	28	28	26
Production, processing and preserving of beef	24	23	23	22		23	21	24	24	24
Prod., proc. and preserving of poultry meat	16	18	17	15		11	10	9	8	8
Production of prepared meat dishes	19	16	15	15		16	17	18	18	16
Other prod., proc. and pres. of meat products	139	133	126	117		85	81	76	81	85
Prod., proc. and filleting of fish and fish prod.	118	109	99	89		85	83	80	75	68
Smoking and salting of fish	71	66	60	62		51	47	47	47	47
Processing and preserving of potatoes	6	7	6	7		6	7	7	9	5
Proc. and pres. of fruit and vegetables n.e.c.	37	34	32	31		31	29	34	34	30
Mfr. of margarine and similar edible fats	13	12	7	7		8	7	7	7	6
Operation of dairies and cheese making	73	67	65	54		56	53	48	71	48
Manufacture of ice cream	14	13	12	11		11	9	13	13	13
Manufacture of grain mill products	21	20	19	21		15	14	15	16	14
Manufacture of starches and starch products	9	8	8	7		8	6	6	5	7
Mfr. of prep. feeds for agricul.& fur farming	52	52	46	47		48	45	40	42	43
Manufacture of prepared pet feeds	13	15	15	16		12	12	11	9	9
Mfr. of bread and other bakery products	58	46	42	43		38	35	37	35	36
Bakeries	1443	1374	1361	1318		1217	1185	1134	1111	1049
Mfr. of rusks & biscuit., pres.pastrygoods & cakes	28	29	25	23		26	26	26	25	20
Mfr. of cocoa, chocolate & sugar confectionery	48	47	49	52		47	47	50	54	51
Manufacture of condiments and seasonings	17	15	14	16		17	17	15	13	18
Manufacture of other food products n.e.c.	55	55	50	41		39	49	50	51	56
Manufacture of beer	18	17	15	12		12	11	11	10	14
Production of mineral waters and soft drinks	10	11	14	17		15	15	17	14	12
Total number or firms	2339	2221	2152	2075		1907	1853	1803	1800	1705

Note: After 2002 “Manufacture of other food products n.e.c.” is divided into “Manufacture of other food products n.e.c.” and “Manufacture of dietary supplements”. Number of firms “Manufacture of other food products n.e.c.” = 15 and “Manufacture of dietary supplements” = 41. Total = 56. “Manufacture of grain mill products” is divided into 14 firms of “Manufacture of grain mill products” and 2 firms of “Industrial manufacturing and processing of seeds” in 2003.

To examine consolidation further, table 3.2 summarises both numbers of firms and sales per firm for food processors, for the years 1999-2003.[8] Across all NACE six-figure food processing industries, sales per firm rose 22% while the number of firms declined 11%. Industries which are known to have significant entry by small firms (e.g. micro-breweries) are not fully reflected in this data, probably because the new entrants are too small to be included.

It is notable that in some of the industries where the number of firms rose (e.g. brewing, cocoa and chocolate) sales per firm was static or falling over the period. In contrast, reductions in numbers of firms in an industry tends to be associated with an increase in sales per firm. The correlation between these two variables is -14% (significant at 1% level of test). The largest increases in sales per firm are associated with beef, poultry, condiments and soft drinks. The reported increase in sales per firm for the feeds industry probably includes diversification into a variety of other products.

Table 3.2. Percentage change in sales per firm and number of firms: processing

	Sales per firm			Number of firms		
Industry	1999	2003	% change	1999	2003	% change
Production, processing and preserving of pork	786,367	933,868	19	30	26	-13
Production, processing and preserving of beef	38,201	65,364	71	23	24	4
Prod., proc. and preserving of poultry meat	232,775	372,236	60	11	8	-27
Production of prepared meat dishes	259,852	294,917	13	16	16	0
Other prod., proc. and pres. of meat products	30,476	24,245	-20	85	85	0
Prod., proc. and filleting of fish and fish prod.	78,669	107,198	36	85	68	-20
Smoking and salting of fish	26,121	37,183	42	51	47	-8
Processing and preserving of potatoes	79,711	161,704	103	6	5	-17
Proc. and pres. of fruit and vegetables n.e.c.	85,257	87,307	2	31	30	-3
Mfr. of margarine and similar edible fats	80,785	103,315	28	8	6	-25
Operation of dairies and cheese making	443,038	561,081	27	56	48	-14
Manufacture of ice cream	31,321	52,241	67	11	13	18
Manufacture of grain mill products	84,714	88,278	4	15	14	-7
Manufacture of starches and starch products	92,464	79,090	-14	8	7	-13
Mfr. of prep. feeds for agriculture& fur farming	53,449	323,796	506	48	43	-10
Manufacture of prepared pet feeds	144,728	159,760	10	12	9	-25
Mfr. of bread and other bakery products	81,996	95,259	16	38	36	-5
Bakeries	3,394	3,485	3	1217	1,049	-14
Mfr. of rusks & biscuit., pres. pastry goods & cakes	90,122	83,497	-7	26	20	-23
Mfr. of cocoa, chocolate & sugar confectionery	64,644	61,899	-4	47	51	9
Manufacture of condiments and seasonings	26,958	54,549	102	17	18	6
Manufacture of other food products n.e.c.	137,032	97,872	-29	39	56	44
Manufacture of beer	516,529	477,700	-8	12	14	17
Production of mineral waters and soft drinks	135,726	252,593	86	15	12	-20
Average and total	58,216	71,288	22	1,907	1,705	-11

[8] in order to ensure data compatibility with wholesale and retail data, and to exclude numbers from before the data break at 1998/1999.

Figures 3.1-3.3 sketch the development of numbers of firms during 1999-2003. Figure 3.1 covers a range of food processing industries, which (aside from potato processing and breweries) generally show a slight decline during 1999-2003.

Figure 3.1. Number of firms: processing of fruit and vegetables, fish, drinks, coffee, and tobacco (1999=100)

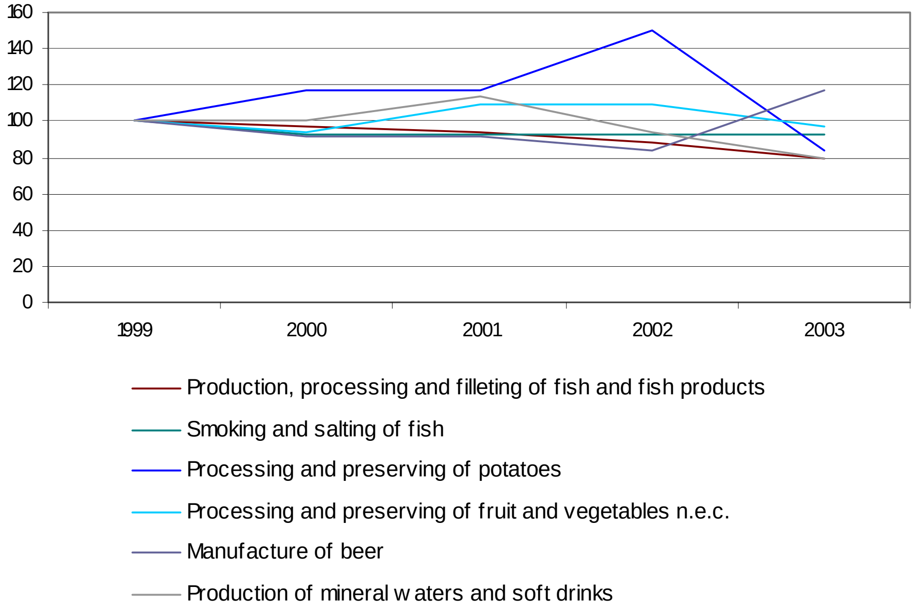


Figure 3.2 shows somewhat steady paths of consolidation in the meat and dairy processing industries. Processing of poultry meat, oils and fats, show the largest decline (35% between 1999 and 2003) in the number of firms, while most other food processing industries show small declines. The use of indexed numbers amplifies small changes where there are small numbers of firms (e.g. ice cream manufacture).

Figure 3.2. Number of firms: processing of meat and dairy (1999=100)

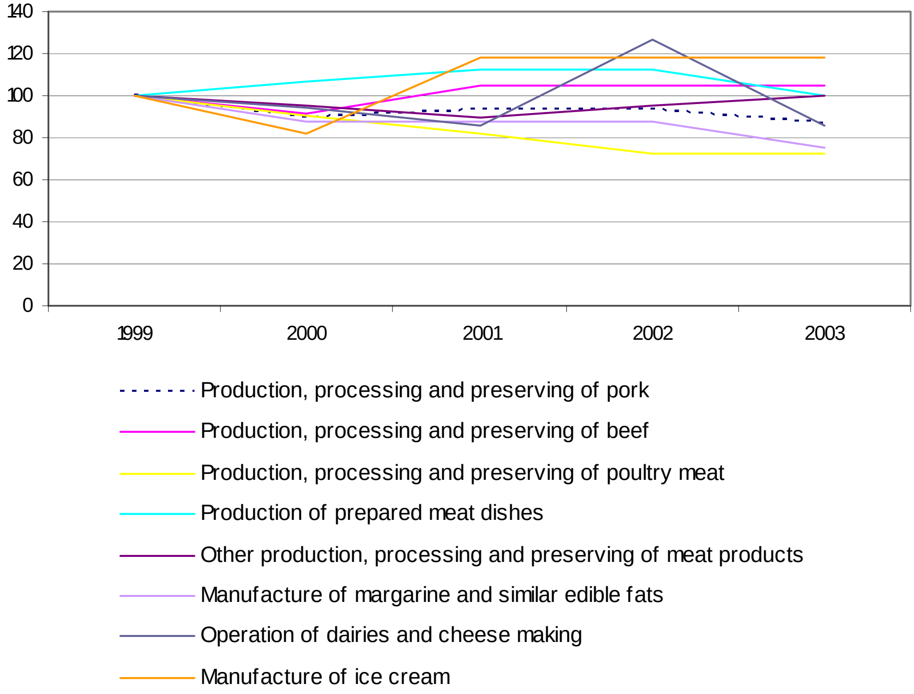
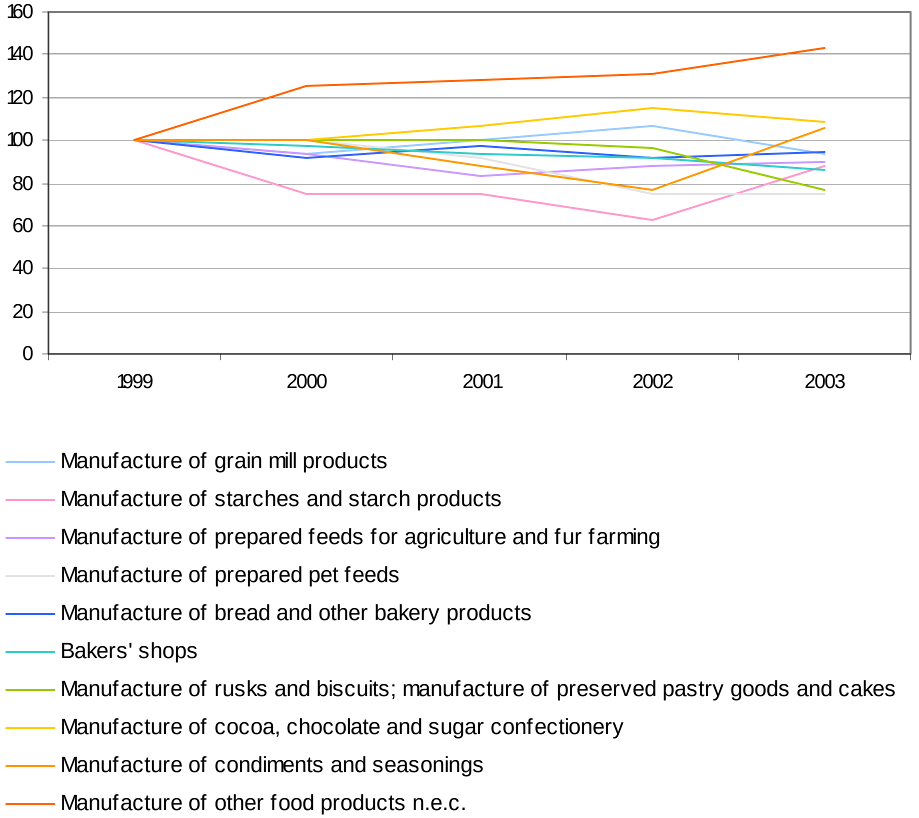


Figure 3.3 presents a general trend of consolidation across a range of food industries, showing a more mixed picture than for livestock products. The "other food products" and confectionery industries show the largest increases. Starch and pet food industries show the largest declines.

Figure 3.3. Number of firms: processing of other food (1999=100)



3.2. Wholesale

Declines in the number of firms in the food wholesale industries have far exceeded those in the food processing industries (tables 3.3 and 3.4): all food wholesaling industries have experienced declines. It should be noted that the data for the wholesale industry firms appear to be greatly affected by the 1998/1999 data break.

Table 3.3. Number of firms: wholesale

Industry	1998		1999	2000	2001	2002	2003
Wholesale of fruit and vegetables	491	DATA BREAK	261	254	240	221	219
Wholesale of meat and meat products	368		294	283	262	240	235
Ws. of dairy produce, eggs and edible oils and fats	183		152	128	115	120	130
Wholesale of beer and soft drinks	229		128	129	107	92	91
Wholesale of wine and spirits	436		228	209	208	215	220
Wholesale of fruit and vegetable juice etc.	17		15	11	11	13	15
Wholesale of tobacco products	20		17	16	17	16	14
Ws of bread, cakes, sugar, choc. & sugar confection	175		130	109	108	106	101
Wholesale of coffee, tea, cocoa and spices	90		74	67	71	64	75
Wholesale of fish and products thereof	402		318	310	305	307	308
Wholesale of health food products	121		66	75	77	72	80
Other spec. ws. of food, beverages and tobacco	149		90	90	87	96	108
Non-spec. ws. of food, beverages and tobacco	331		256	224	234	235	241
Total number of firms	3012		2029	1905	1842	1797	1837

Between 1999 and 2003 the number of food wholesaling firms declined by 9%. As for food processing, there was a generally corresponding increase in sales per firm across all but a few wholesale industries, with an aggregate increase in sales per firm of 9% (table 3.4). The correlation between the two variables is -47% (significant at 1% level of test).

The largest consolidations were observed in wholesale of beer and soft drinks, meat, and bakery/confectionery (which is combined for wholesale data). Both wholesale of meat and meat products and wholesale of wines and spirits suffered a decline of 11% in sales per firm, but most food wholesale industries experienced an increase in sales per firm. Unspecialised food wholesale firms declined by 6% in number but saw sales per firm rise 21%.

Table 3.4. Percentage change in sales per firm and number of firms: wholesale

Industry	sales per firm 1999	sales per firm 2003	% change	number of firms 1999	number of firms 2003	% change
Wholesale of fruit and vegetables	26,280	35,322	34	261	219	-16
Wholesale of meat and meat products	58,225	51,903	-11	294	235	-20
Ws. of dairy produce, eggs and edible oils and fats	47,595	112,485	136	152	130	-14
Wholesale of beer and soft drinks	11,340	27,028	138	128	91	-29
Wholesale of wine and spirits	28,258	25,068	-11	228	220	-4
Wholesale of fruit and vegetable juice etc.	29,122	17,913	-38	15	15	0
Wholesale of tobacco products	98,375	115,674	18	17	14	-18
Ws of bread, cakes, sugar, choc. & sugar con.	35,595	36,321	2	130	101	-22
Wholesale of coffee, tea, cocoa and spices	29,185	16,060	-45	74	75	1
Wholesale of fish and products thereof	58,817	55,088	-6	318	308	-3
Wholesale of health food products	39,284	35,109	-11	66	80	21
Other spec. ws. of food, bev. and tobacco	44,327	50,952	15	90	108	20
Non-spec. ws. of food, bev. and tobacco	143,509	172,976	21	256	241	-6
Average and total	58,326	63,286	9	2029	1837	-9

Figures 3.4-3.6 chart numbers of food wholesaling firms in the period 1999-2003, with most industries showing steady declines. Meat, dairy, beverages and bakery products all show steady and strong declines.

Figure 3.4. Number of firms: wholesale of fruit and vegetables, fish, drinks, coffee, and tobacco (1999=100)

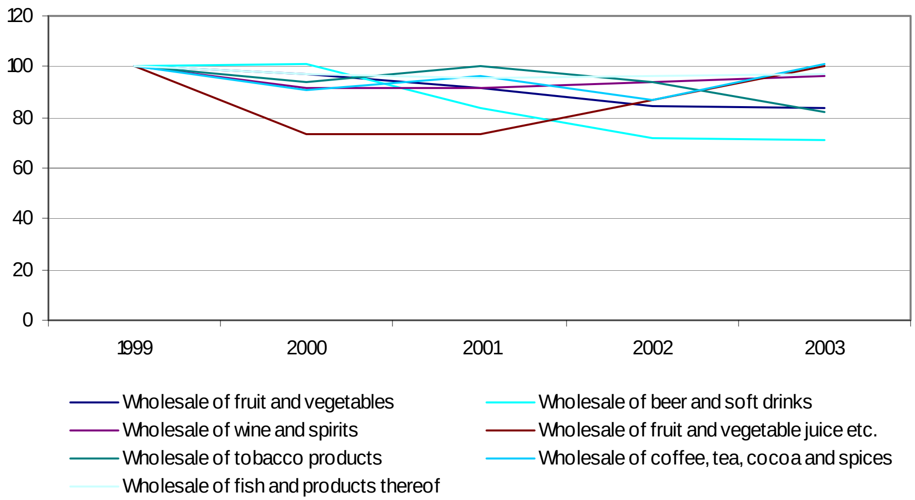


Figure 3.5. Number of firms: wholesale of meat and dairy (1999=100)

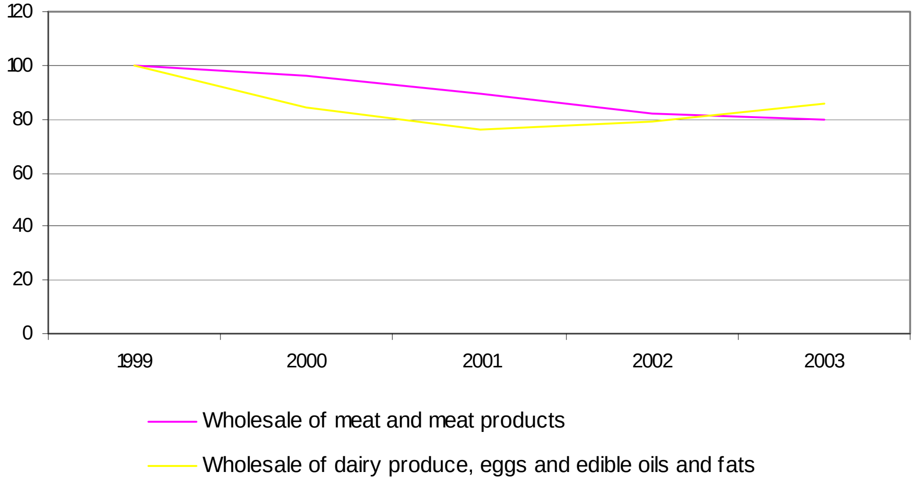
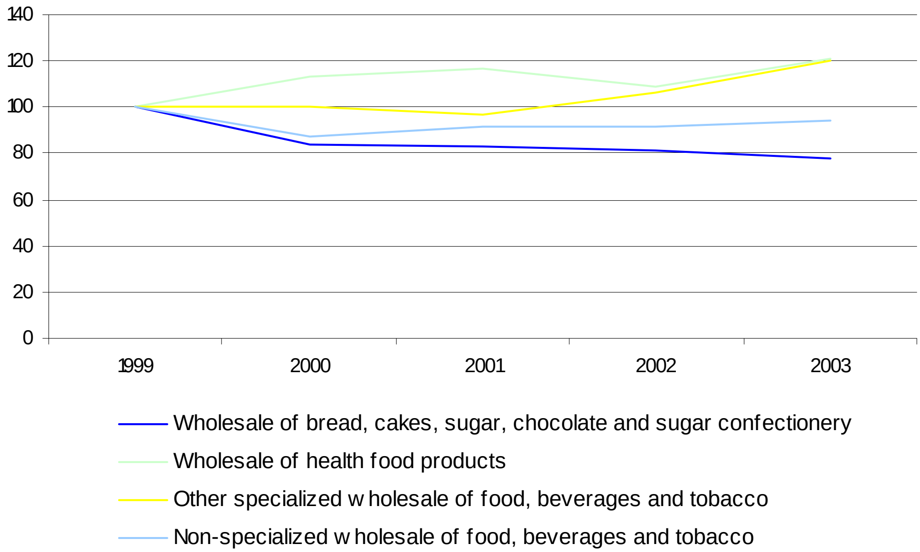


Figure 3.6. Number of firms: wholesale of other food (1999=100)



3.3. Retail

In contrast to food processing and wholesale, Danish food retailing has featured a mosaic of increases and declines in numbers of firms across industrial classifications (tables 3.5 and 3.6). For food retailing (unlike processing and wholesale) industrial classifications refer to sales format. Across both data periods in table 3.5, increases in the number of firms are generally seen for supermarkets. Other non-specialised stores show small-to-moderate changes, and specialised food retailing industries show significant declines.

Table 3.5. Number of firms: retail

Industry	1995	1996	1997	1998	DATA BREAK	1999	2000	2001	2002	2003
Grocer's shops*	2615	2459	2297	2112		1804	1991	1914	1835	1759*
All-night shops	893	931	943	949		871	847	875	832	872
Supermarkets	466	449	449	464		469	648	647	623	611
Variety stores	22	15	14	9		12	22	21	22	24
Retail sale of fruit and vegetables	927	849	815	823		600	595	580	584	556
Retail sale of meat and meat products	1014	964	940	901		820	814	773	736	724
Ret. sale of fish, game, crustaceans & molluscs	349	345	319	314		270	293	274	265	248
Ret. sale of bread, cakes and flour confectionery	117	130	120	113		86	89	87	79	67
Retail sale of chocolate and sugar confectionery	572	630	632	602		382	373	353	340	309
Retail sale of alcoholic and other beverages	180	204	238	262		196	199	215	229	231
Retail sale of tobacco products	1373	1266	1186	1109		961	893	829	793	676
Retail sale of cheese	195	182	169	158		131	131	120	125	119
Retail sale of health food	321	238	222	240		126	133	127	145	136
Other ret. sale of food & beverage in spec. stores	104	109	110	95		77	79	84	93	114
Total number of firms	9148	8771	8454	8151		6805	7107	6899	6701	6446

* For 2003 only, the data series identifies discount stores amongst food retailers. In this table the discount store data for 2003 is combined with grocery shops'. Of the 1759 firms owning grocery shops in Denmark in listed here for 2003, 113 firms ran discount stores.

Table 3.6 presents a mixture of consolidation outcomes for food retailing in the period 1999-2003. Food retailing sales per firm, as a whole, increased by 7% while the number of food retailing firms declined by 5%. The number of specialised food retailing firms declined by up to 30% over this period but sales per firm generally rose: health food retailing increased sales per firm by 26%. However, there was no statistically-significant correlation between consolidation and change in sales per firm.

Amongst non-specialised food retailing industries, the numbers of firms owning supermarkets and variety stores increased considerably, while the number owning grocers' shops declined. Sales per firm by supermarkets and variety stores both declined significantly. It is notable that supermarkets' sales per firm have declined 31% while the number of supermarket firms has increased by 30%.

Table 3.6. Changes in sales per firm and number of firms

	sales per firm			number of firms		
Industry:	1999	2003	% change	1999	2003	% change
Grocer's shops	14,000	17,939	28	1804	1759	-2
All-night shops	4,459	3,348	-25	871	872	0
Supermarkets	117,804	81,618	-31	469	611	30
Variety stores	1,633,795	882,844	-46	12	24	100
Retail sale of fruit and vegetables	1,499	1,726	15	600	556	-7
Retail sale of meat and meat products	2,840	2,814	-1	820	724	-12
Ret. sale of fish, game, crustaceans & molluscs	2,140	2,080	-3	270	248	-8
Ret. sale of bread, cakes & flour confectionery	2,222	2,117	-5	86	67	-22
Retail sale of chocolate & sugar confectionery	2,246	2,295	2	382	309	-19
Retail sale of alcoholic and other beverages	3,201	3,121	-3	196	231	18
Retail sale of tobacco products	3,574	5,043	41	961	676	-30
Retail sale of cheese	2,007	1,735	-14	131	119	-9
Retail sale of health food	1,629	2,058	26	126	136	8
Other ret. sale of food & bev. in spec. stores	1,683	1,504	-11	77	114	48
Average and total	16,681	17,791	7	6805	6446	-5

Figures 3.7-3.9 present trends in food retail consolidation in the period 1999-2003. Most trends are smoother than for food processing and wholesaling, with the general result that specialised food retailing firms have declined in number while supermarkets have increased.

Figure 3.7. Number of firms: retail sale of fruit and vegetables, fish, drinks, coffee, and tobacco (1999=100)

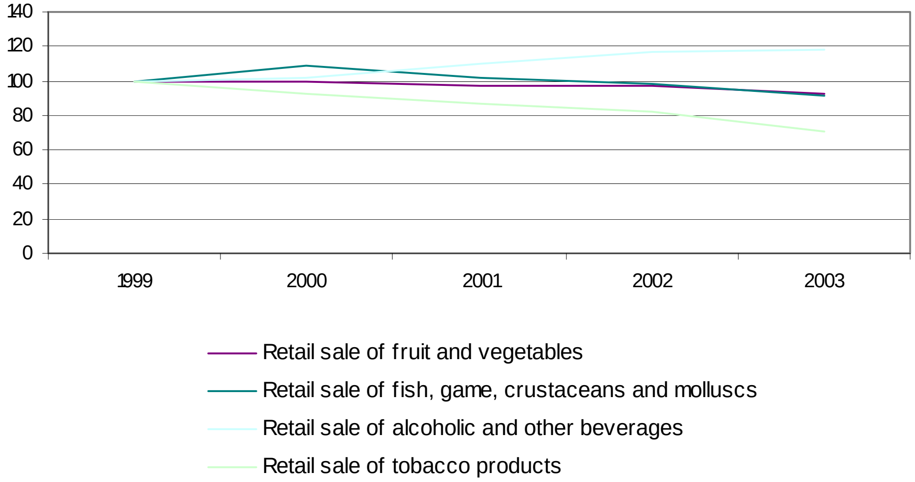


Figure 3.8. Number of firms: retail sale of meat and dairy (1999=100)

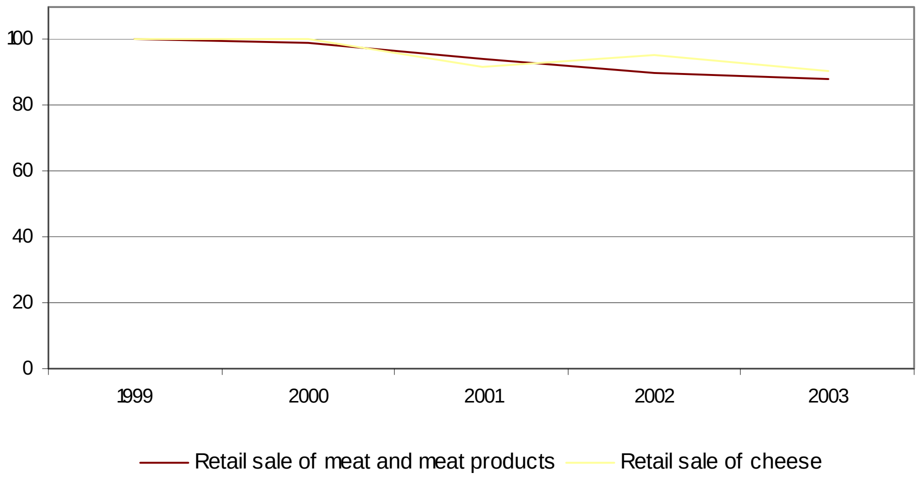
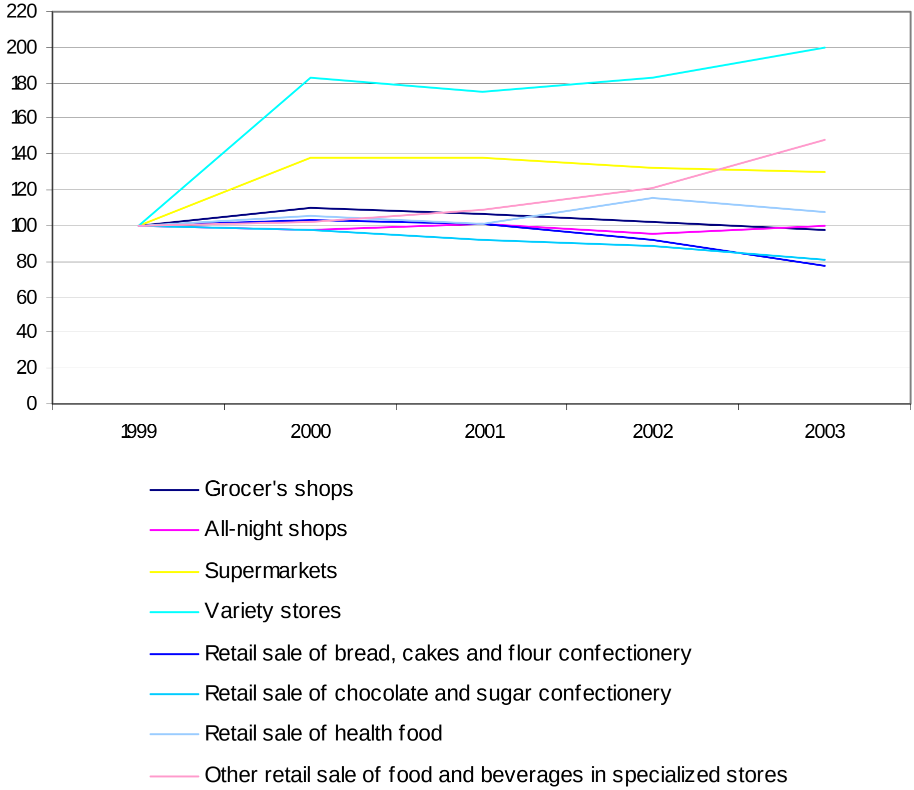


Figure 3.9. Number of firms: retail sale of food (1999=100)



4. Sales

4.1. Processing

Table 4.1 presents real processing sales for all Danish food processing industries for 1995-2003. Aggregate food processing industry sales are seen to be stable during this period, at between 108 and 125 billion DKK: a low-high fluctuation of around 15%. Aggregate sales peaked in 2001 at 125 billion DKK.

Within these aggregate results, just a few industries (poultry meat, dairy (excluding ice cream), feeds,[9] confectionery and non-alcoholic beverages) increased sales, and some industries experienced significant declines in sales (beef processing, fish processing, starch and starch products, brewing).

[9] This result may reflect diversification into other sectors by feed-producing firms.

Table 4.1. Sales: processing

Industry	1995	1996	1997	1998	1999	2000	2001	2002	2003
Production, processing and pres. of pork	28.192.386	28.369.821	29.235.315	27.188.102	25.256.714	27.158.372	30.129.694	25.886.437	24.280.575
Production, processing and pres. of beef	3.524.130	1.621.909	1.316.517	1.454.221	940.662	1.132.142	1.454.713	1.499.620	1.568.733
Prod., proc. & preserving of poultry meat	2.155.744	2.315.384	2.426.441	2.680.835	2.741.323	3.067.058	3.152.257	2.891.869	2.977.888
Production of prepared meat dishes	4.444.933	3.984.160	4.159.658	4.241.049	4.451.197	5.778.069	5.291.436	5.407.359	4.718.665
Other prod., proc. and pres. of meat prod.	2.236.694	2.205.533	2.437.511	1.959.000	2.773.339	2.922.594	2.355.728	1.789.406	2.060.788
Production, proc. and filleting of fish and fish products	9.189.943	7.910.064	6.739.319	7.047.102	7.159.023	7.471.345	6.959.214	7.873.270	7.289.467
Smoking and salting of fish	1.458.633	1.435.738	1.475.135	1.540.134	1.426.243	2.093.937	2.300.007	1.520.721	1.747.586
Processing and preserving of potatoes	736.997	828.367	825.002	907.143	512.032	853.753	777.646	772.182	808.519
Proc. and pres. of fruit & vegetables n.e.c.	1.429.638	1.644.277	1.699.189	1.824.918	2.829.587	2.548.771	2.480.597	2.395.817	2.619.216
Mfr. of margarine and similar edible fats	585.282	497.444	577.308	666.712	691.914	652.303	589.705	604.287	619.889
Operation of dairies and cheese making	21.588.357	21.388.297	21.316.444	24.797.931	26.561.899	25.505.360	26.881.903	26.394.695	26.931.912
Manufacture of ice cream	2.558.402	2.175.322	2.298.591	1.492.319	368.854	505.334	483.861	677.109	679.131
Manufacture of grain mill products	2.280.068	2.131.607	1.290.160	1.256.920	1.360.429	1.241.989	1.169.470	2.388.797	1.235.898
Mfr. of starches and starch products	1.430.752	682.023	759.204	723.434	791.938	854.169	751.198	702.307	553.631
Mfr. of prep. feeds for agriculture & fur farming	1.885.374	1.850.525	2.185.363	2.866.158	2.746.682	9.859.469	9.992.227	11.414.545	13.923.210
Manufacture of prepared pet feeds	1.145.151	1.264.997	1.393.056	1.549.778	1.859.365	1.536.750	1.591.004	1.395.939	1.437.841
Mfr. of bread and other bakery products	3.033.093	2.539.687	3.575.558	3.348.417	3.335.863	3.468.425	3.414.761	3.431.886	3.429.321
Bakers' shops	4.491.017	4.295.240	4.271.321	4.417.231	4.421.546	4.338.006	3.828.669	3.613.259	3.655.710
Mfr. of rusks & bisc., pres. pastry & cakes	2.393.957	2.936.079	1.880.541	2.000.819	2.508.626	1.977.756	2.317.051	1.987.820	1.669.943
Mfr. of cocoa, choc. & sugar confect.	2.732.986	2.749.135	2.776.553	3.031.779	3.252.770	3.327.410	3.329.209	3.259.662	3.156.824
Mfr. of condiments and seasonings	459.603	622.374	643.301	728.833	490.640	469.214	785.917	788.549	981.874
Mfr. of other food products n.e.c.	6.529.397	6.152.971	5.070.988	4.982.255	5.721.575	7.030.393	7.073.472	6.141.187	5.480.822
Manufacture of beer	8.076.995	7.685.623	7.681.838	6.391.382	6.636.000	5.838.519	5.364.875	4.924.231	6.687.803
Prod. of mineral waters and soft drinks	1.399.463	1.546.794	1.821.724	2.031.389	2.179.644	2.690.136	2.468.200	2.427.190	3.031.121
Total sales	113.958.996	108.833.369	107.856.036	109.127.861	111.017.865	122.321.275	124.942.813	120.188.142	121.546.365

Note: 1000DKK, current prices, deflated with industrial index. Note: After 2002 “Manufacture of other food products n.e.c.” is divided into “Manufacture of other food products n.e.c.” and “Manufacture of dietary supplements”.

Just a few food processing industries can claim over 5% of food processing sales, the largest 2003 shares being held by pork processing (26.1% of food processing sales) dairy (19.7%), fish (7.3%) and beer (7.1%). The shares held by both dairy and pork processing have increased between 1995 and 2003, while most other industries have seen their share of sales decline (table 4.2). The largest declines in share of sales are for beef processing (down from 3.1% to 1.5%).

Table 4.2. Percentage of sales: processing

Industry	---- % of sales ---- 1995	2003
Production, processing and preserving of pork	24,7	26,1
Production, processing and preserving of beef	3,1	1,5
Prod., processing and preserving of poultry meat	1,9	2,1
Production of prepared meat dishes	3,9	3,7
Other prod., proc. and pres. of meat products	2,0	2,0
Prod., proc. and filleting of fish and fish products	8,1	7,3
Smoking and salting of fish	1,3	1,3
Processing and preserving of potatoes	0,6	0,8
Proc. and preserving of fruit and vegetables n.e.c.	1,3	1,5
Manufacture of margarine and similar edible fats	0,5	0,5
Operation of dairies and cheese making	18,9	19,7
Manufacture of ice cream	2,2	2,0
Manufacture of grain mill products	2,0	2,0
Manufacture of starches and starch products	1,3	0,6
Mfr. of prep. feeds for agriculture and fur farming	1,7	1,7
Manufacture of prepared pet feeds	1,0	1,2
Manufacture of bread and other bakery products	2,7	2,3
Bakers' shops	3,9	3,9
Mfr. of rusks, biscuits; pres. pastry goods & cakes	2,1	2,7
Mfr. of cocoa, chocolate and sugar confectionery	2,4	2,5
Manufacture of condiments and seasonings	0,4	0,6
Manufacture of other food products n.e.c.	5,7	5,7
Manufacture of beer	7,1	7,1
Production of mineral waters and soft drinks	1,2	1,4
Total sales	100	100

Aggregation of table 4.2's data into larger industrial groupings (see table 4.3) emphasises the general stability in the share of food processing sales in the period 1995-2003. "Confectionery" and "fruits and vegetables" are the groupings showing growth in shares of sales while "fish" is in decline for this period.

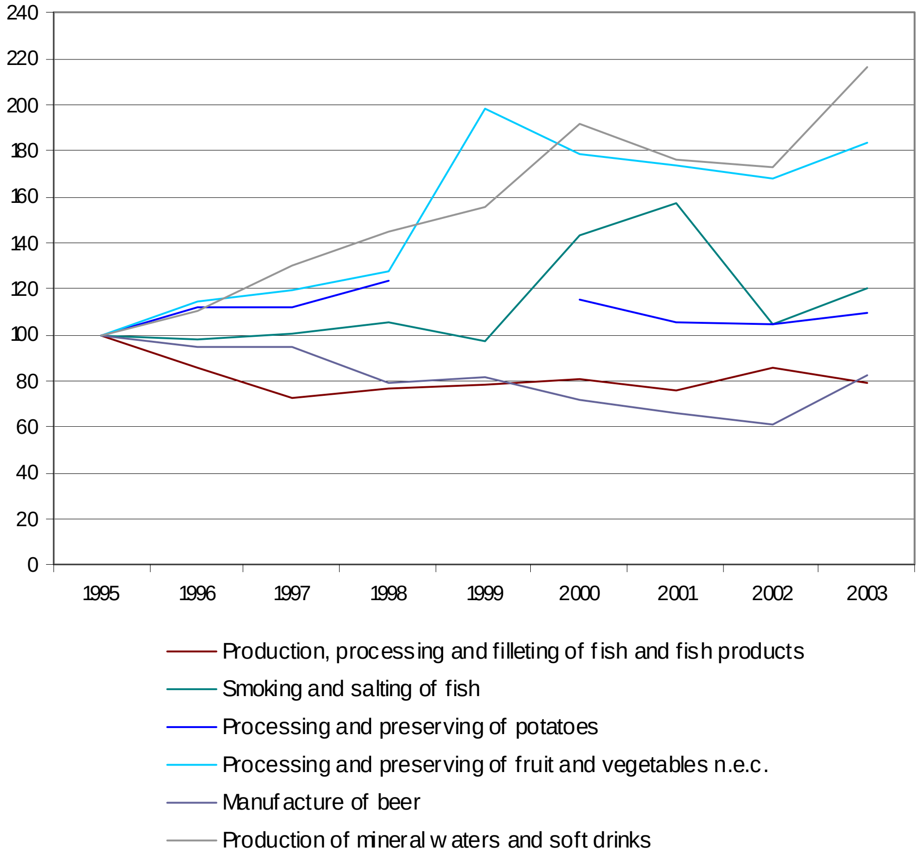
Table 4.3. Percentage of sales in industrial groupings: processing

Aggregated industry group	---------- % of sales -------- 1995	2003
All "meat and dairy" (1)	57,3	57,5
All "fish"(2)	9,3	8,6
All "fruit and vegetables" (3)	1,9	2,3
All "other food" (4)	11,6	11,1
All "bakery" (5)	6,6	6,3
All "confectionery" (6)	4,9	5,8
All "drinks, coffee, and tobacco" (7)	8,3	8,5
Total	100	100

Note: All "Meat and dairy" (1) include: Production, processing and preserving of pork, Production, processing and preserving of beef, Prod., processing and preserving of poultry meat, Production of prepared meat dishes, Other prod., proc. and pres. of meat products. Manufacture of margarine and similar edible fats, Operation of dairies and cheese making, Manufacture of ice cream. All "fish" include (2): Prod., proc. and filleting of fish and fish products, Smoking and salting of fish. All "fruit and vegetables" (3) include: Processing and preserving of potatoes, Proc. and preserving of fruit and vegetables n.e.c., All "other food" (4) include: Manufacture of grain mill products, Manufacture of starches and starch products, Mfr. of prep. feeds for agriculture and fur farming, Manufacture of prepared pet feeds, Manufacture of condiments and seasonings, Manufacture of other food products n.e.c., "All "bakery" (5) include: Manufacture of bread and other bakery products, Bakers' shops. All "confectionery" (6) include: Mfr. of rusks, biscuits; pres. pastry goods & cakes, Mfr. of cocoa, chocolate and sugar confectionery, All "drinks, coffee, and tobacco" (7) include: Manufacture of beer, Production of mineral waters and soft drinks.

The path taken by food processing industries' sales is depicted in figures 4.1-4.3. Sales from soft drinks and fruit and vegetables industries have almost doubled between 1995 and 2003, while the brewing industry has seen sales decline by 20% between 1995 and 1996 and then be static through to 2003. Potato processing (a discontinuous data set) has seen sales rise 10-20% in the period.

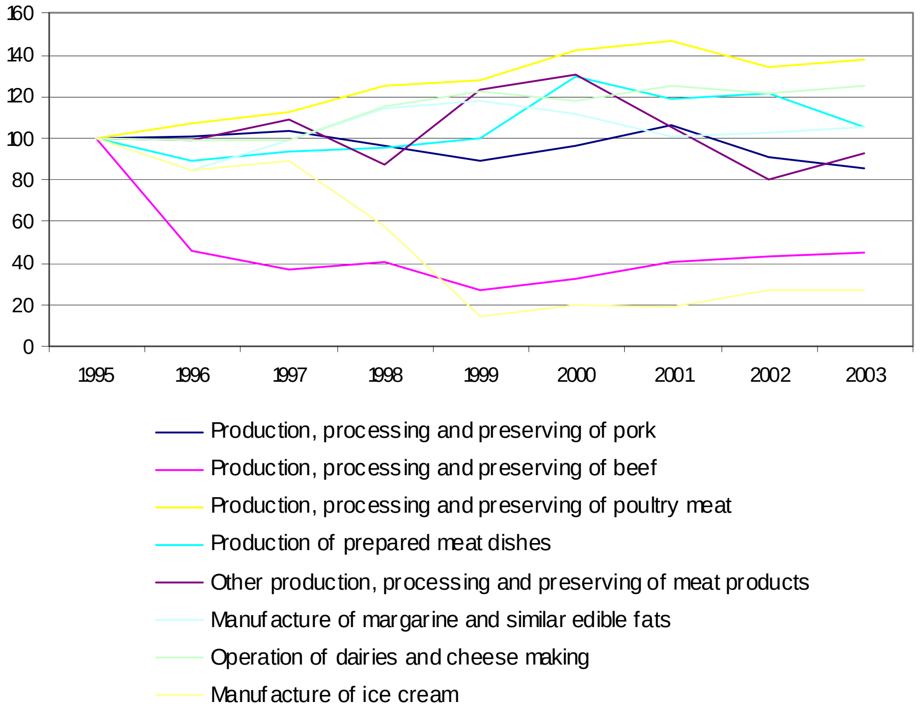
Figure 4.1. Sales: processing of fruit and vegetables, fish, drinks, coffee, and tobacco (1995=100)



Note: Processing and preserving of potatoes 1999 has been deleted as an outlier.

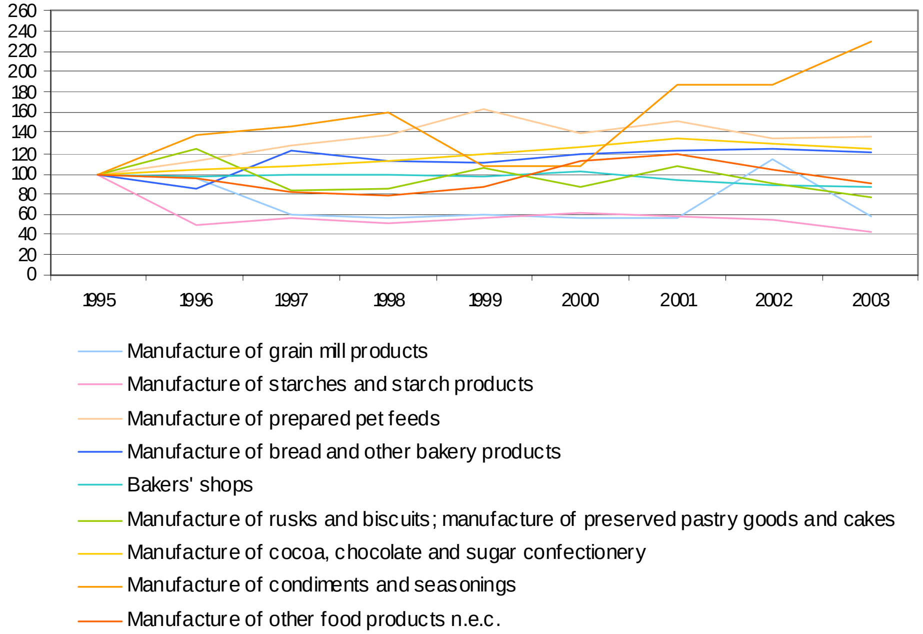
Meat and dairy sales at the processing stage (figure 4.2) present three disparate categories: large declines in beef and ice cream sales; steady increases in sales of poultry, dairy and prepared meats; and static sales by the pork industry and fats and oils.

Figure 4.2. Sales: processing of meat and dairy (1995=100)



Across a range of grain-related and confectionery food industries (see figure 4.3), a wide variety of changes in sales is observed. Industries producing condiments and seasonings and pet food have experienced considerable growth in sales (a doubling in the former case), while starches and grain milling products showed sharp declines 1995-1997 with somewhat static sales since then.

Figure 4.3. Sales: processing of other food (1995=100)



4.2. Wholesale

Real aggregate sales by food wholesaling firms are at 116 billion DKK in 2003, somewhat unchanged from the 118 billion in 1998, but a recovery from the 102 billion DKK in 2000-2001 (table 4.4). There is a range of development within this industrial sector, with the largest increases in sales for dairy, eggs, and oils and fats, and for non-specialised wholesalers. The largest fall in sales was for meat products wholesalers.

Table 4.4. Sales: wholesale

Industry	1998	1999	2000	2001	2002	2003
Wholesale of fruit and vegetables	7.649.277	6.858.999	7.112.708	6.834.583	7.279.162	7.735.477
Wholesale of meat and meat products	22.785.936	17.118.134	15.087.879	13.938.736	13.146.082	12.197.204
Ws. of dairy produce, eggs and edible oils & fats	8.858.699	7.234.391	7.430.576	7.494.164	13.239.830	14.623.114
Wholesale of beer and soft drinks	2.962.687	1.451.553	1.389.639	1.661.744	2.267.987	2.459.543
Wholesale of wine and spirits	7.356.715	6.442.773	5.570.306	5.699.443	5.914.966	5.515.037
Wholesale of fruit & vegetable juice etc.	504.602	436.825	478.416	437.162	263.362	268.688
Wholesale of tobacco products	1.680.813	1.672.371	1.713.479	1.690.783	1.862.076	1.619.431
Ws. of bread, cakes, sugar, choc & sugar confectionery	3.086.717	4.627.305	3.721.107	2.852.108	3.856.776	3.668.470
Wholesale of coffee, tea, cocoa and spices	3.427.463	2.159.683	2.209.651	1.364.498	1.158.111	1.204.519
Wholesale of fish and products thereof	18.170.014	18.703.700	19.085.799	17.655.100	17.573.347	16.966.994
Wholesale of health food products	2.152.214	2.592.721	2.489.575	2.443.037	2.552.427	2.808.754
Other spec. ws. of food, beverages and tobacco	3.962.848	3.989.436	4.027.337	3.996.075	4.849.911	5.502.813
Non-spec. ws. of food, beverages and tobacco	35.746.380	36.738.372	32.533.370	36.084.178	39.906.232	41.687.247
Total sales	118.344.365	110.026.264	102.849.841	102.151.611	113.870.269	116.257.291

Note: 1000 DKK, current prices, deflated with industrial index. Note: "Wholesale of bread, cakes, and biscuits" and "Wholesale of sugar, chocolate, and sugar confectionery" are joined in 2003 into "Wholesale of bread, cakes, sugar, chocolate, and sugar confectionery".

In contrast to food processing sales, industrial shares of wholesale sales have changed significantly between 1998 and 2003 (table 4.5), with meat wholesalers' share declining from 19.3% to 10.5%, non-specialised wholesale increasing from 30.2% to

35.9%, and a variety of other 1-2 percentage point changes over that period. Fish wholesalers' share of wholesale sales remained at around 15%.

Table 4.5. Percentage of sales: wholesale

	----- % of sales -----	
	1998	2003
Wholesale of fruit and vegetables	6,5	6,7
Wholesale of meat and meat products	19,3	10,5
Ws. of dairy prod., eggs, edible oils, fats	7,5	12,6
Wholesale of beer and soft drinks	2,5	2,1
Wholesale of wine and spirits	6,2	4,7
Ws. of fruit and vegetable juice etc.	0,4	0,2
Wholesale of tobacco products	1,4	1,4
Ws. of bread, cakes, sugar, choc., sugar confectionery	2,6	3,2
Wholesale of coffee, tea, cocoa and spices	2,9	1,0
Wholesale of fish and products thereof	15,4	14,6
Wholesale of health food products	1,8	2,4
Other spec. ws. of food, beverages and tobacco	3,3	4,7
Non-spec. ws. of food, beverages and tobacco	30,2	35,9
Total sales	100	100

Grouping of industries (table 4.6) magnifies the changes in share of wholesale sales, with the large declines in meat and dairy in contrast to "other food" which includes non-specialised wholesale.

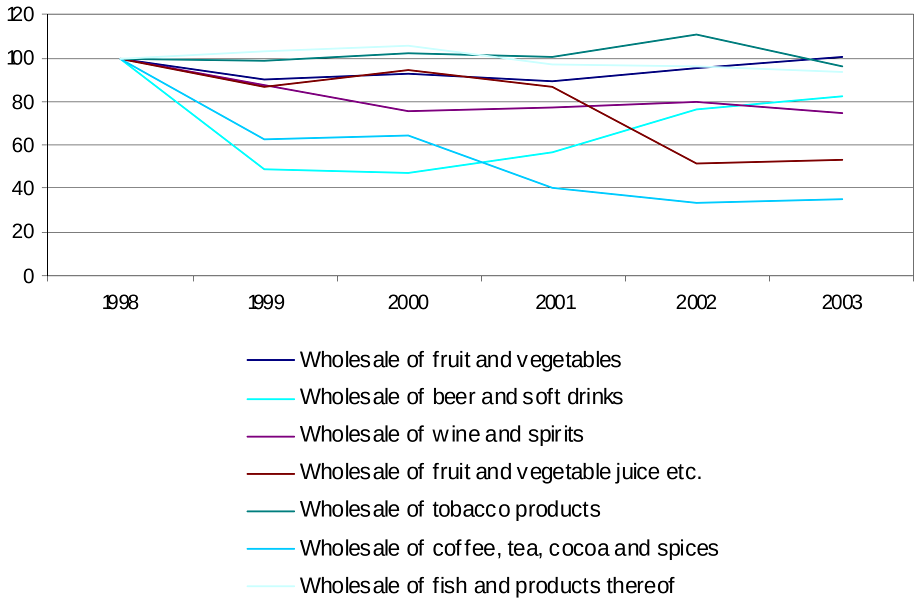
Table 4.6. Percentage of sales in industrial grouping: wholesale

	---------- % sales ----------	
	1998	2003
All "Fruit and vegetables" (1)	6,9	6,9
All "Meat and dairy" (2)	26,7	23,1
All "Drinks, coffee, and tobacco" (3)	13,0	9,3
All "confectionery" (4)	2,6	3,2
All "Fish" (5)	15,4	14,6
All "Other food" (6)	35,4	43,0
Total	100	100

Note: All "meat and dairy" (2) include: Ws. of dairy prod., eggs, edible oils, fats, Wholesale of meat and meat products. All "fruit and vegetables" (1) include: Wholesale of fruit and vegetables, Ws. of fruit and vegetable juice etc. All "fish" (5) include: Wholesale of fish and products thereof. All "drinks, coffee, and tobacco" (3) include: Wholesale of beer and soft drinks, Wholesale of wine and spirits, Wholesale of tobacco products, Wholesale of coffee, tea, cocoa and spices. All "confectionery" (4) include: Ws. of bread, cakes, sugar, choc., sugar confectionery. All "other food" (6) include: Wholesale of health food products, Other spec. ws. of food, beverages and tobacco, Non-spec. ws. of food, beverages and tobacco.

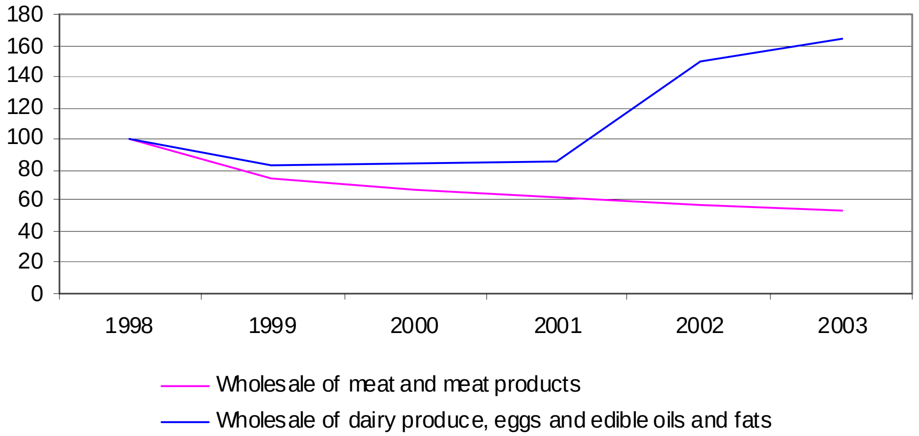
The development paths of wholesale industry sales are shown in figures 4.4-4.6. In figure 4.4, only tobacco wholesaling has shown a sales increase in the period 1998-2003. Beer and wine wholesale sales show significant declines, although the former shows a recovery after 2000. Wholesale sales of fruits and vegetables in 2003 returned to 1998 levels after declines of up to 10%, but for fruit and vegetable juices the decline (mainly after 2001) has been around 50% from 1998 levels.

Figure 4.4. Sales: wholesale of fruit and vegetables, fish, drinks, coffee, and tobacco (1998=100)



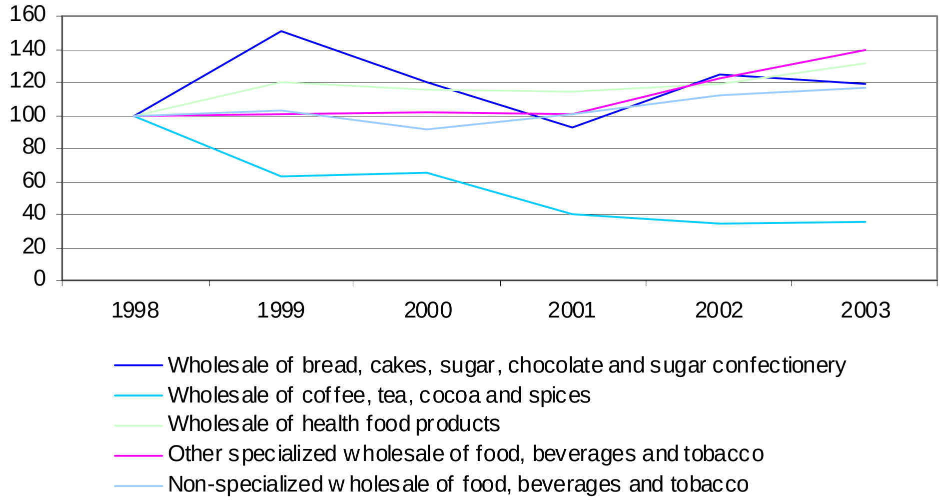
Significant changes in sales are apparent in the meat and dairy wholesale industries (figure 4.5). Although meat and meat products sales at the processing stage have held steady or increased (see previous section), wholesale meat sales have declined. Wholesale sales of dairy, eggs and edible oils have increased by 60% over 1998 levels, following a decline in sales 1998-2001.

Figure 4.5. Sales: wholesale of meat and dairy (1998=100)



Sales in grain-based, and other, food wholesale industries presents a mixed picture (figure 4.6). Sales by commodity-specialised wholesale industries has steadily declined since 1998, in contrast to unspecialised food wholesale sales, which have risen about 20% 1998-2003. Wholesale sales of bread and cakes, and of health food products, have fluctuated substantially in 1998-2003 for a net increase of 20-40%.

Figure 4.6. Sales: wholesale of other food (1998=100)



4.3. Retail

Real retail food sales have increased from 111 billion DKK in 1995 to about 115 billion DKK in 2003, and that slight growth has been somewhat steady (table 4.7). Particularly large increases in sales are observed for grocery stores and supermarkets, while specialised food retail industries all experienced declining sales.

Shares of sales amongst food retail industries have re-aligned significantly between 1995 and 2003 (see tables 4.8 and 4.9). The supermarket industry has increased its share of retail food sales from 29.3% in 1995 to 62.8% in 2003. This apparently has occurred mainly at the expense of grocery and variety stores, as specialised food retail industries' shares of sales were very small in 1995 and have not changed very much since then. Table 4.9 shows that specialised food retail industries held a share of food retail sales equal to 10.5% in 1995, and that this had declined to 8.0% by 2003.

Table 4.7. Sales: retail

Industry	1995	1996	1997	1998	1999	2000	2001	2002	2003
Grocer's shops	23.341.424	24.169.594	25.200.341	24.667.924	25.256.709	28.466.568	29.147.193	30.376.173	31.554.280
All-night shops	3.927.130	3.994.602	3.899.187	4.116.717	3.884.166	3.710.945	3.715.173	3.713.716	2.919.400
Supermarkets	32.575.383	28.067.381	28.198.418	53.368.651	55.250.238	52.663.503	50.496.735	53.140.543	49.868.888
Variety stores	39.548.213	39.741.942	40.069.038	18.915.058	19.605.543	21.662.028	21.678.910	19.633.055	21.188.262
Retail sale of fruit and vegetables	1.215.539	1.061.323	994.106	1.008.632	899.667	897.435	898.333	970.769	959.563
Retail sale of meat and meat products	2.522.052	2.488.833	2.431.444	2.453.859	2.329.140	2.352.275	2.227.668	2.117.535	2.037.399
Ret. of fish, game, crustaceans & molluscs	548.485	556.070	555.872	582.024	577.920	610.814	573.042	553.022	515.839
Ret. of bread, cakes&flour confectioner	259.171	276.836	222.739	193.758	191.060	203.890	178.087	162.855	141.835
Ret. of chocolate & sugar confectionery	1.010.482	1.137.542	1.000.289	903.948	858.077	915.898	752.763	689.423	709.275
Ret. sale of alcoholic and other bev.	566.968	586.145	586.734	603.807	627.490	630.682	647.125	637.790	720.967
Retail sale of tobacco products	4.841.808	5.433.935	5.271.982	4.888.449	3.434.869	3.812.205	3.661.503	3.610.046	3.409.244
Retail sale of cheese	341.132	307.582	289.104	271.573	262.861	253.064	229.868	213.291	206.428
Retail sale of health food	231.318	205.091	214.829	210.877	205.218	204.756	233.364	242.206	279.920
Other ret. sale of food& bev in spec stores	150.950	136.011	119.607	101.094	129.555	133.124	130.391	151.809	171.465
Total sales	111.080.055	108.162.887	109.053.691	112.286.370	113.512.512	116.517.187	114.570.156	116.212.233	114.682.764

Note: 1000DKK, current prices, deflated with net index. Note: After 2002 grocer's shops and discount stores are divided. Discount stores have been added to grocer's shops.

Table 4.8. Percentage of sales: retail		
Industry	---- % of sales ---	
	1995	2003
Grocer's shops	21,0	8,2
All-night shops	3,5	2,5
Supermarkets	29,3	62,8
Variety stores	35,6	18,5
Retail sale of fruit and vegetables	1,1	0,8
Retail sale of meat and meat products	2,3	1,8
Retail sale of fish, game, crustaceans and molluscs	0,5	0,4
Retail sale of bread, cakes and flour confectionery	0,2	0,1
Retail sale of chocolate and sugar confectionery	0,9	0,6
Retail sale of alcoholic and other beverages	0,5	0,6
Retail sale of tobacco products	4,4	3,0
Retail sale of cheese	0,3	0,2
Retail sale of health food	0,2	0,2
Other retail sale of food and beverages in specialized stores	0,1	0,1
Total sales	100	100

Table 4.9. Percentage of sales by specialist and non-specialist: retail		
	---- % of sales ----	
Aggregate industry group	1995	2003
Unspecialised food retail industries*	89,5	92,0
Specialised food retail industries**	10,5	8,0
Total sales	100	100

*Grocer's shops, all-night shops, supermarkets and variety stores.
**Retail sale of fruit and vegetables, retail sale of meat and meat products, retail sale of fish, game, crustaceans and molluscs, retail sale of bread, cakes and flour confectionery, retail sale of chocolate and sugar confectionery, retail sale of alcoholic and other beverages, retail sale of tobacco products, retail sale of cheese, retail sale of health food, other retail sale of food and beverages in specialized stores8

Figures 4.7-4.9 present trends in sales by retail food industries. Our data suggests that supermarkets' large increase in sales was between 1997 and 1998, while grocers' shops have had a more steady and sustained increase in sales. For most specialised food retail industries, the decline in sales indicated above has been steady during the period 1995-2003. Retail sales by specialised health food stores declined 1995-1999, to recover to 20% above 1995 levels in 2003.

Figure 4.7. Sales: retail of fruit and vegetables, fish, drinks, coffee, and tobacco (1995=100)

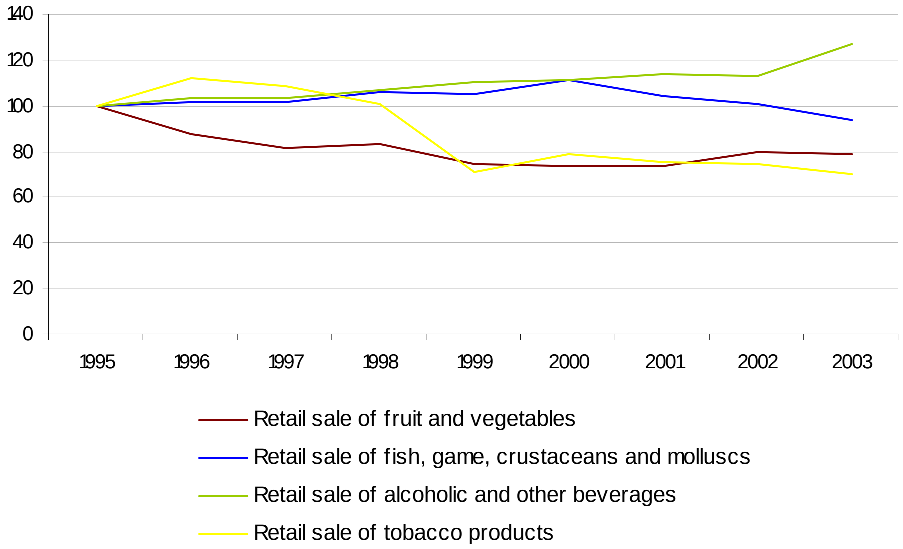


Figure 4.8. Sales: retail of meat and dairy (1995=100)

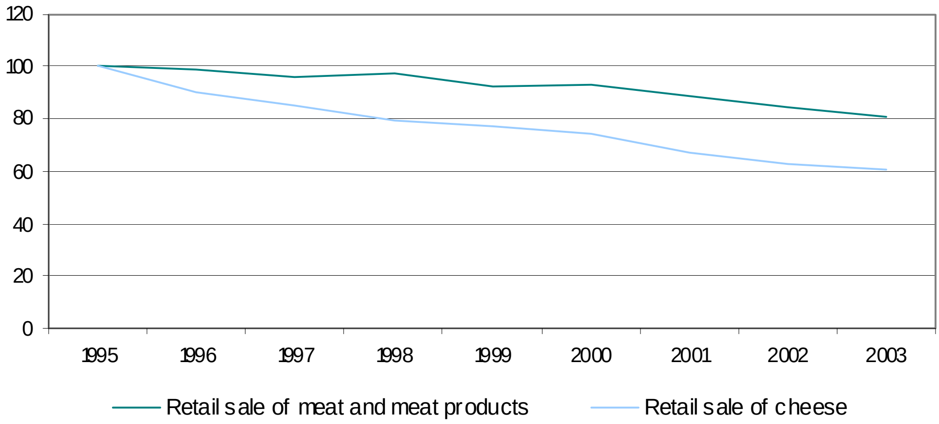
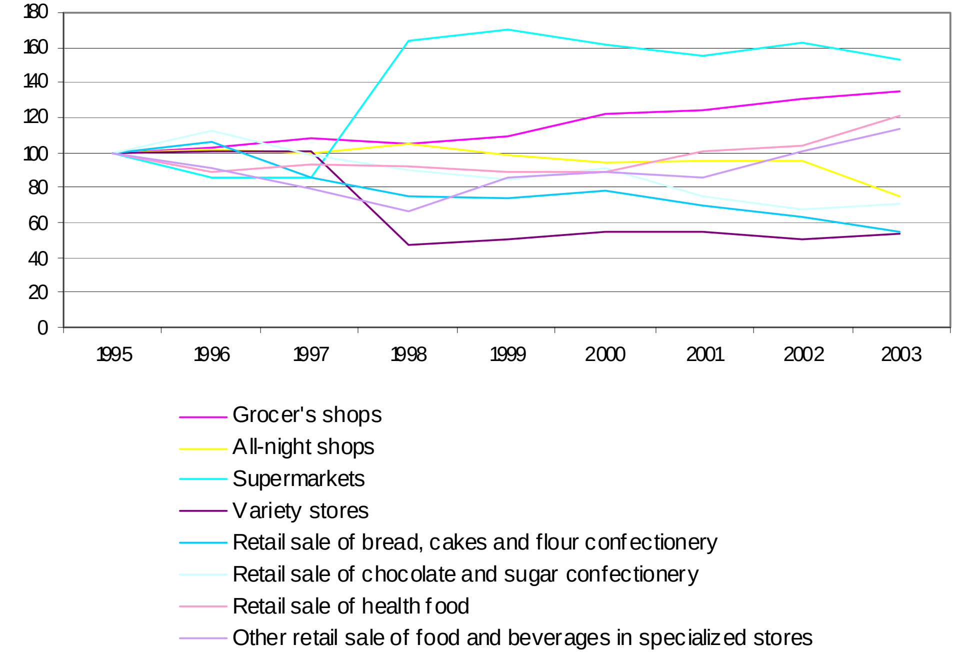


Figure 4.9. Sales: retail of other food (1995=100)



5. Value added

5.1. Processing

Despite generally static real sales in the period 1995-2003, food processing industries' aggregate value added increased from 24.6 to over 29.5 billion DKK, or by 20%. Moreover, the increase in value added was steady and sustained, while food processing industries' sales fluctuated over this period. Industries with significant increases in value added 1995-2003 include poultry meat, dairy, confectionery and non-alcoholic beverages. Large declines in value added are apparent for ice cream manufacture and bakeries (see table 5.1).

The share of aggregate processing food value added held by separate industries shows significant re-alignment between 1995 and 2003 (table 5.2). That held by firms in the pork processing industry fell from 23.8 to 21%, while there have been significant increases (albeit from a low 1995 share) for poultry meat, production of prepared meats, confectionery and non-alcoholic beverages. Dairy and cheese processing leapt from a share of 11.9% of food processing value added to 15% in the same period. When processing industries are aggregated (table 5.3) these changes are less evident, although the share in value added of "other food" rises to over 15% in 2003.

Table 5.1. Value added: processing

Industry	1995	1996	1996	1997	1998	1999	2000	2001	2002	2003
Prod. processing and preserving of pork	5.849.480	5.866.189	5.866.189	5.869.748	6.075.392	6.174.464	5.754.890	6.014.869	5.627.928	6.212.624
Prod., processing and preserving of beef	350.274	219.446	219.446	171.829	181.170	143.271	164.963	264.498	277.379	312.776
Prod., proc. and pres. of poultry meat	479.762	556.593	556.593	513.070	602.760	626.678	749.652	885.647	762.966	698.140
Production of prepared meat dishes	789.629	688.936	688.936	847.800	980.445	1.067.257	1.285.370	1.191.124	1.358.937	1.281.323
Other prod., proc. & pres. of meat prod.	509.638	549.336	549.336	613.207	560.203	690.753	681.620	655.484	545.461	578.120
Prod., proc. & filleting of fish & fish prod.	1.551.330	1.264.723	1.264.723	1.336.344	1.385.270	1.360.073	1.310.100	1.263.734	1.465.896	1.358.483
Smoking and salting of fish	248.978	293.164	293.164	326.486	331.733	323.807	396.531	540.411	368.971	474.275
Processing and preserving of potatoes	196.493	252.567	252.567	237.865	265.507	132.231	226.902	218.132	246.929	247.987
Proc & pres. of fruit & vegetables n.e.c.	328.623	364.074	364.074	367.798	403.541	580.616	572.920	551.139	560.545	588.927
Mfr of margarine and similar edible fats	68.173	83.391	83.391	87.367	88.678	102.348	123.464	107.604	100.177	84.505
Operation of dairies and cheese making	2.939.943	2.977.181	2.977.181	3.002.745	3.507.263	3.739.533	4.045.030	4.644.903	4.533.438	4.422.423
Manufacture of ice cream	615.812	501.030	501.030	586.112	296.246	139.410	158.814	137.050	159.439	195.760
Manufacture of grain mill products	435.476	409.997	409.997	222.065	225.262	250.312	182.475	216.172	489.457	278.063
Mfr of starches and starch products	120.394	182.767	182.767	178.094	183.436	173.870	213.074	263.745	254.546	162.011
Manufacture of prepared feeds for agri-culture and fur farming	279.123	263.053	263.053	285.617	358.630	389.915	937.567	991.665	1.434.154	1.602.455
Manufacture of prepared pet feeds	336.895	381.851	381.851	357.363	360.589	458.851	431.968	368.239	413.319	403.363
Mfr of bread and other bakery products	1.112.476	945.965	945.965	1.345.943	1.315.017	1.248.294	1.237.229	1.281.781	1.326.328	1.365.319
Bakeries	2.056.112	2.034.072	2.034.072	2.058.111	2.236.487	2.171.169	2.073.141	1.895.487	1.907.708	1.940.017
Mfr of rusks & biscuits, pres. pastry etc.	508.898	809.069	809.069	427.420	489.407	641.434	515.089	591.445	591.336	479.946
Mfr of cocoa, choc. & sugar confection.	879.380	849.773	849.773	867.615	987.567	1.061.778	1.045.440	1.156.891	1.180.547	1.124.278
Mfr of condiments and seasonings	106.149	144.090	144.090	143.895	157.889	114.481	100.818	157.802	164.979	203.746
Manufacture of other food products n.e.c. n.ncn.e.c.	1.827.023	1.834.654	1.834.654	1.453.725	1.545.780	1.805.588	2.101.353	2.344.654	2.060.907	2.050.856
Manufacture of beer	2.532.582	2.369.046	2.369.046	3.254.651	3.705.318	2.524.909	2.372.409	2.011.359	2.186.215	2.703.065
Prod. of mineral waters and soft drinks	487.050	563.649	563.649	634.186	748.893	556.819	837.594	629.356	668.716	753.686
Total value added	24.609.694	24.404.615	24.404.615	25.189.055	26.992.482	26.477.861	27.518.412	28.383.191	28.686.276	29.522.147

Note: 1000DKK, current prices, deflated with industrial index. Note: After 2002 “Manufacture of other food products n.e.c.” is divided into “Manufacture of other food products n.e.c.” and “Manufacture of dietary supplements”.

Table 5.2. Percentage of value added: processing

Industry	% of value added 1995	2003
Production, processing and preserving of pork	23,8	21,0
Production, processing and preserving of beef	1,4	1,1
Prod., processing and preserving of poultry meat	1,9	2,4
Production of prepared meat dishes	3,2	4,3
Other prod., proc. and pres. of meat products	2,1	2,0
Prod., proc. and filleting of fish and fish products	6,3	4,6
Smoking and salting of fish	1,0	1,6
Processing and preserving of potatoes	0,8	0,8
Proc. and preserving of fruit and vegetables n.e.c.	1,3	2,0
Manufacture of margarine and similar edible fats	0,3	0,3
Operation of dairies and cheese making	11,9	15,0
Manufacture of ice cream	2,5	0,7
Manufacture of grain mill products	1,8	0,9
Manufacture of starches and starch products	0,5	0,5
Mfr. of prep. feeds for agriculture and fur farming	1,1	5,4
Manufacture of prepared pet feeds	1,4	1,4
Manufacture of bread and other bakery products	4,5	4,6
Bakers' shops	8,4	6,6
Mfr. of rusks, biscuits; pres. pastry goods & cakes	2,1	1,6
Mfr. of cocoa, chocolate and sugar confectionery	3,6	3,8
Manufacture of condiments and seasonings	0,4	0,7
Manufacture of other food products n.e.c.	7,4	6,9
Manufacture of beer	10,3	9,2
Production of mineral waters and soft drinks	2,0	2,6
Total value added	100	100

Table 5.3. Percentage of value added in industrial grouping: processing

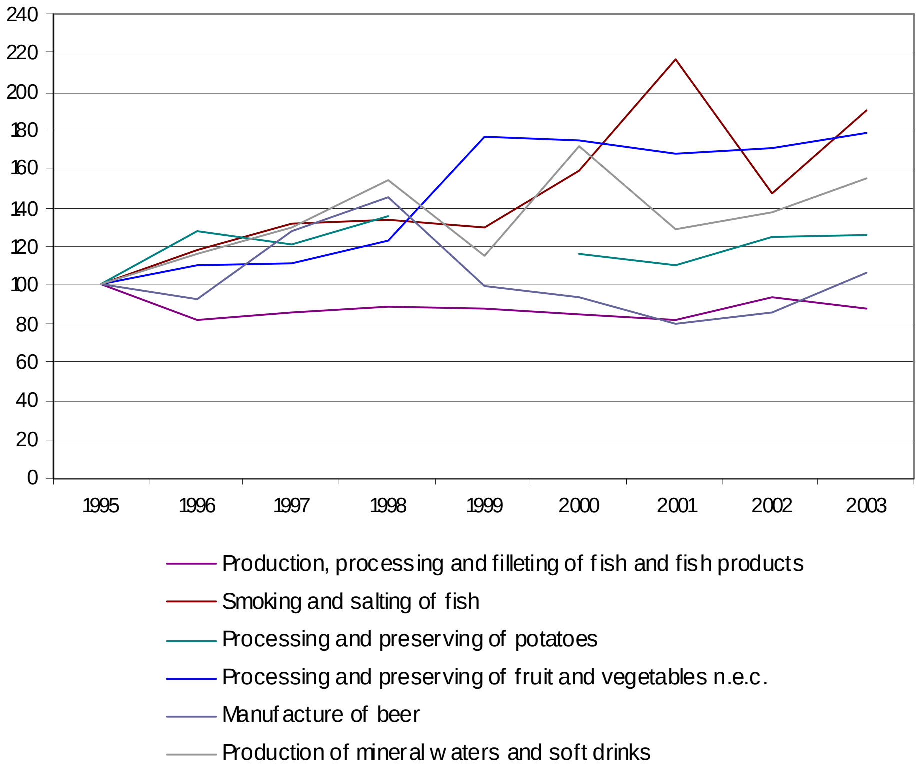
Aggregate industry group	% of value added 1995	2003
All ”Meat and dairy” (1)	47,1	46,7
All “Fish” (2)	7,3	6,2
All “Fruit and vegetables” (3)	2,1	2,8
All ”Other food” (4)	12,2	15,2
All “Bakery” (5)	12,9	11,2
All “Confectionery” (6)	6,1	6,1
All ”Drinks, coffee, and tobacco” (7)	12,3	11,7
Total	100	100

Note: All “Meat and dairy” (1) include: Production, processing and preserving of pork, Production, processing and preserving of beef, Prod., processing and preserving of poultry meat, Production of prepared meat dishes, Other prod., proc. and pres. of meat products. Manufacture of margarine and similar edible fats, Operation of dairies and cheese making, Manufacture of ice cream. All “fish” (2) include: Prod., proc. and filleting of fish and fish products, Smoking and salting of fish. All “fruit and vegetables” (3) include: Processing and preserving of potatoes, Proc. and preserving of fruit and vegetables n.e.c., All “other food” (4) include: Manufacture of grain mill products, Manufacture of starches and starch products, Mfr. of prep. feeds for agriculture and fur farming, Manufacture of prepared pet feeds, Manufacture of condiments and seasonings, Manufacture of other food products n.e.c., All “bakery” (5) include: Manufacture of bread and other bakery products, Bakers' shops. All “confectionery” (6) include: Mfr. of rusks, biscuits; pres. pastry goods & cakes, Mfr. of cocoa, chocolate and sugar confectionery, All “drinks, coffee, and tobacco” (7) include: Manufacture of beer, Production of mineral waters and soft drinks.

The time path taken by food processing industries' value added is shown in figures 5.1-5.3. The data are mixed and highly volatile. Most food processing industries' value added grew in the period 1995-2003. Exceptions include fish processing, bakeries and ice cream manufacture. Large and sustained increases in value addition were achieved by fruit and vegetable processors, fish smokers, mineral water producers, and most meat processing industries (other than beef, for which value addition fell between 1995 and 1999 and then rebounded up until 2003).

The data portray several food processing industries as having experienced very large fluctuations in value added within 1-3 year periods. Some caution must therefore be exercised in interpreting these data, in favour of appreciating the overall trends.

Figure 5.1. Value added: processing of fruit and vegetables, fish, drinks, coffee, and tobacco (1995=100)



Note: Processing and preserving of potatoes 1999 has been deleted as an outlier.

Figure 5.2. Value added: processing of meat and dairy (1995=100)

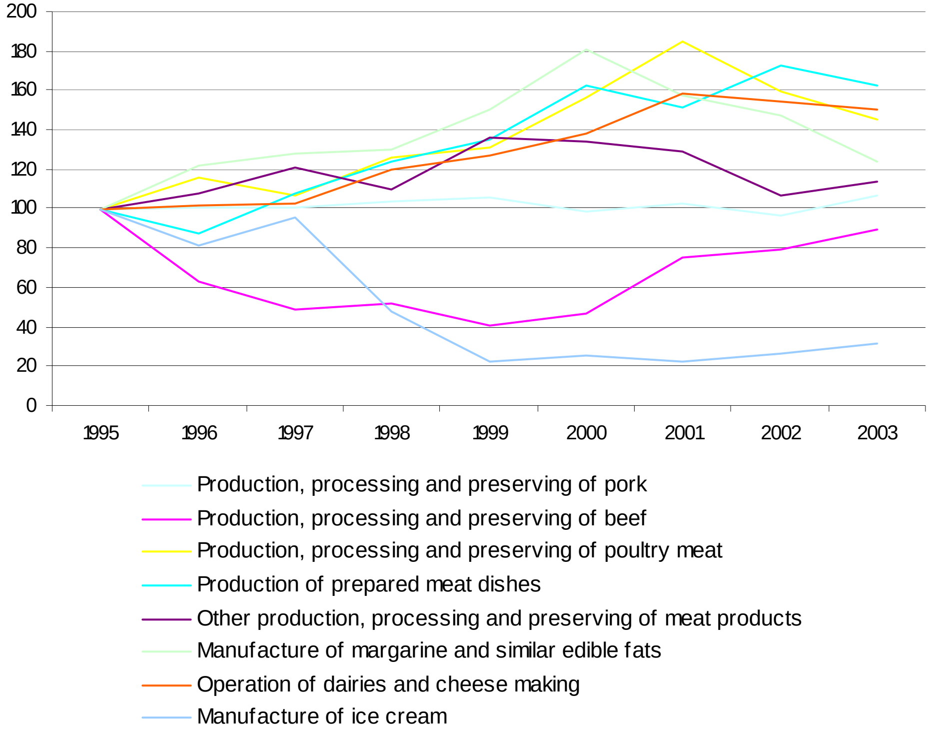
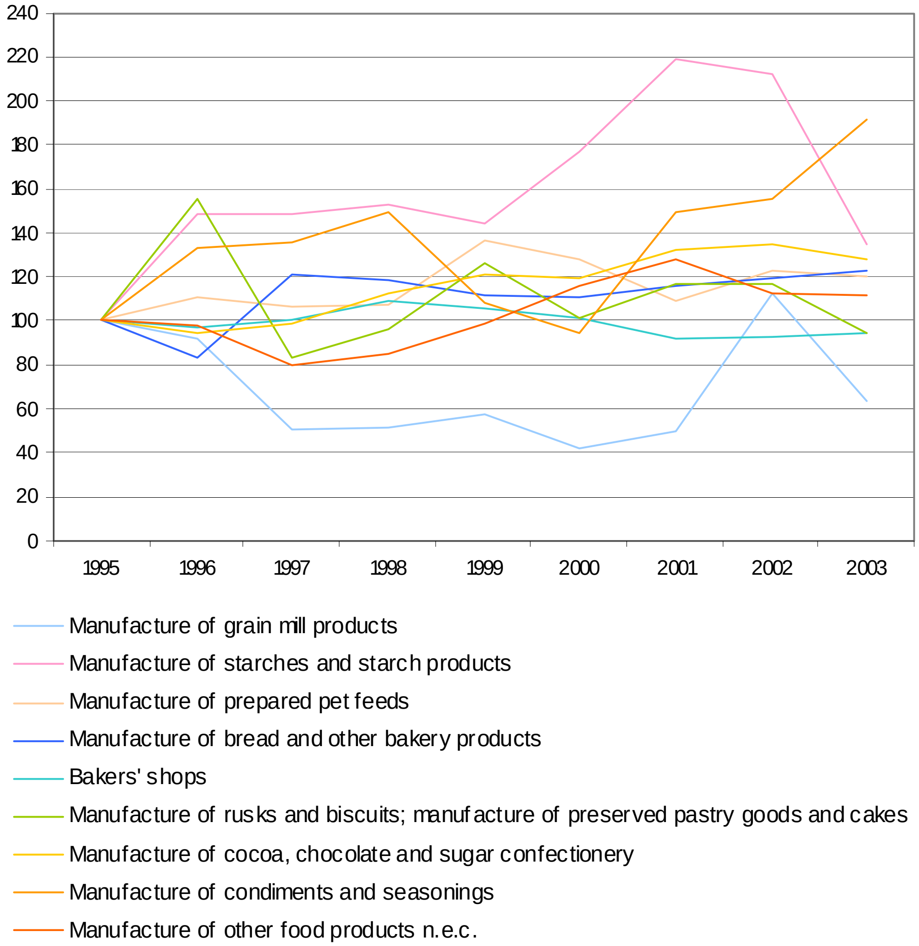


Figure 5.3. Value added: processing of other food (1995=100)



5.2. Wholesale

Aggregate real value added by the food wholesale sector was almost unchanged over the 1998-2003 period, at about 8 billion DKK (table 5.3), although individual processing industries show a rage of developments and somewhat unstable paths of change in value added (see figures 5.5-5.7).

Table 5.4. Value added: wholesale

Industry	1998	1999	2000	2001	2002	2003
Wholesale of fruit and vegetables	670.571	742.204	692.864	743.722	821.518	818.345
Wholesale of meat and meat products	1.227.284	1.302.466	1.107.978	1.005.282	1.130.249	1.026.456
Ws. of dairy produce, eggs & edible etc	701.365	456.278	432.794	480.405	998.735	914.023
Wholesale of beer and soft drinks	377.107	226.911	245.689	273.058	441.348	357.189
Wholesale of wine and spirits	681.569	737.159	640.009	656.151	717.575	702.281
Wholesale of fruit and vegetable juice etc.	29.480	28.612	29.271	44.182	41.152	39.247
Wholesale of tobacco products	92.300	84.623	79.758	93.002	132.160	90.904
Ws of bread, cakes, sugar, chocolate etc.	413.656	458.176	377.389	318.243	440.106	447.038
Wholesale of coffee, tea, cocoa and spices	465.961	372.611	324.282	236.153	212.611	234.393
Wholesale of fish and products thereof	1.018.065	1.216.559	1.137.986	1.212.267	1.118.289	1.092.958
Wholesale of health food products	197.500	243.246	261.495	238.009	236.220	187.815
Other spec. ws. of food, bev. & tobacco	241.927	253.053	227.839	284.406	291.465	352.129
Non-spec. ws. of food, bev. and tobacco	2.151.132	2.165.628	1.890.400	2.137.381	2.254.694	2.332.621
Total value added	8.267.917	8.287.526	7.447.755	7.722.261	8.836.122	8.595.400

Note: 1000 DKK, current prices, deflated with industrial index

Shares of value added over the period are somewhat static (table 5.5), although meat wholesale's share of wholesale value added falls from 14.8 to 11.9% and dairy, eggs and oils' increases from 8.5% to 10.6%.

Table 5.5. Percentage of value added: wholesale

Industry	% of value added	
	1998	2003
Wholesale of fruit and vegetables	8,1	9,5
Ws. of meat and meat products	14,8	11,9
Ws. of dairy produce, eggs, edible oils and fats	8,5	10,6
Wholesale of beer and soft drinks	4,6	4,2
Wholesale of wine and spirits	8,2	8,2
Ws. of fruit & vegetable juice etc.	0,4	0,5
Wholesale of tobacco products	1,1	1,1
Ws. of bread, cakes, sugar, choc. & sugar conf.	5,0	5,2
Wholesale of coffee, tea, cocoa and spices	5,6	2,7
Wholesale of fish and products thereof	12,3	12,7
Wholesale of health food products	2,4	2,2
Other spec. ws. of food, beverages and tobacco	2,9	4,1
Non-spec. ws. of food, beverages and tobacco	26,0	27,1
Total	100	100

Table 5.6. Percentage of value added in industrial grouping: wholesale

Aghgregate industry group	% of value added 1998	2003
All "Fruit and vegetables"(1)	8,5	10,0
All "Meat and dairy "(2)	23,3	22,6
All "Drinks, coffee, and tobacco"(3)	19,6	16,1
All "Confectionery"(4)	5,0	5,2
All "Fish"(5)	12,3	12,7
All "Other food"(6)	31,3	33,4
Total	100	100

Note: (1) All "fruit and vegetables" include: Wholesale of fruit and vegetables, Ws. of fruit and vegetable juice etc. . (2) All "meat and dairy" include: Ws. of dairy prod., eggs, edible oils, fats, Wholesale of meat and meat products. (3) All drinks, coffee, and tobacco" include: Wholesale of beer and soft drinks, Wholesale of wine and spirits, Wholesale of tobacco products, Wholesale of coffee, tea, cocoa and spices. (4) All confectionery" include: Ws. of bread, cakes, sugar, choc., sugar confectionery. (5) All "fish" include: Wholesale of fish and products thereof. (6) All "other food" include: Wholesale of health food products, Other spec. ws. of food, beverages and tobacco, Non-spec. ws. of food, beverages and tobacco.

Figures 5.4-5.6 show the development of food wholesale industries' value added for 1998-2003. These trends are far less volatile than the corresponding series for food processing industries (see previous section). Wholesale industries showing an increase in value added include fruit and vegetable products and juices, wholesalers of dairy, eggs and fat (albeit after a significant decline in value added between 1998 and 2000), and the residual category of "other specialised" food wholesale.

Figure 5.4. Value added: wholesale of fruit and vegetables, fish, drinks, coffee, and tobacco (1998=100)

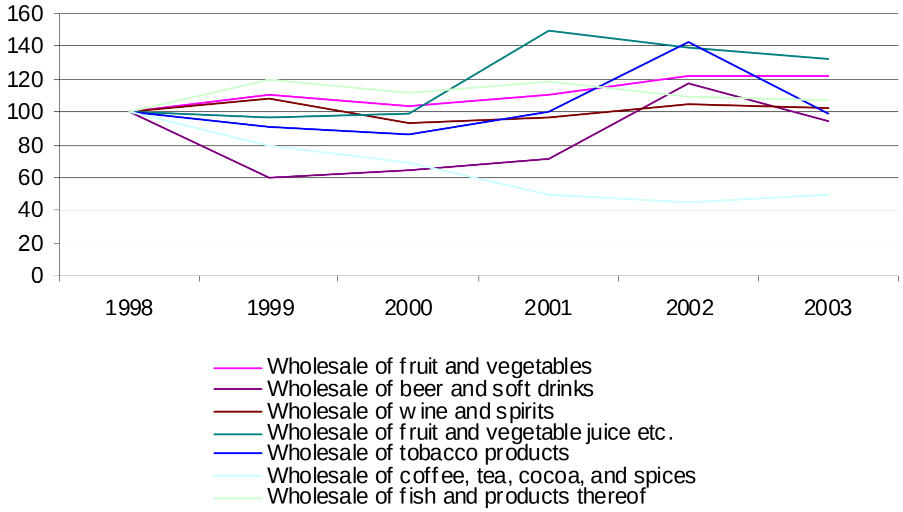


Figure 5.5. Value added: wholesale of meat and dairy (1998=100)

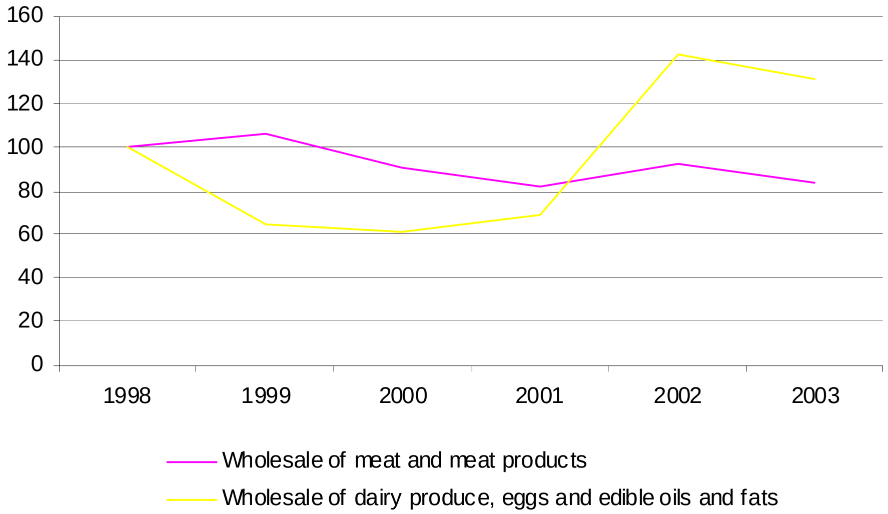
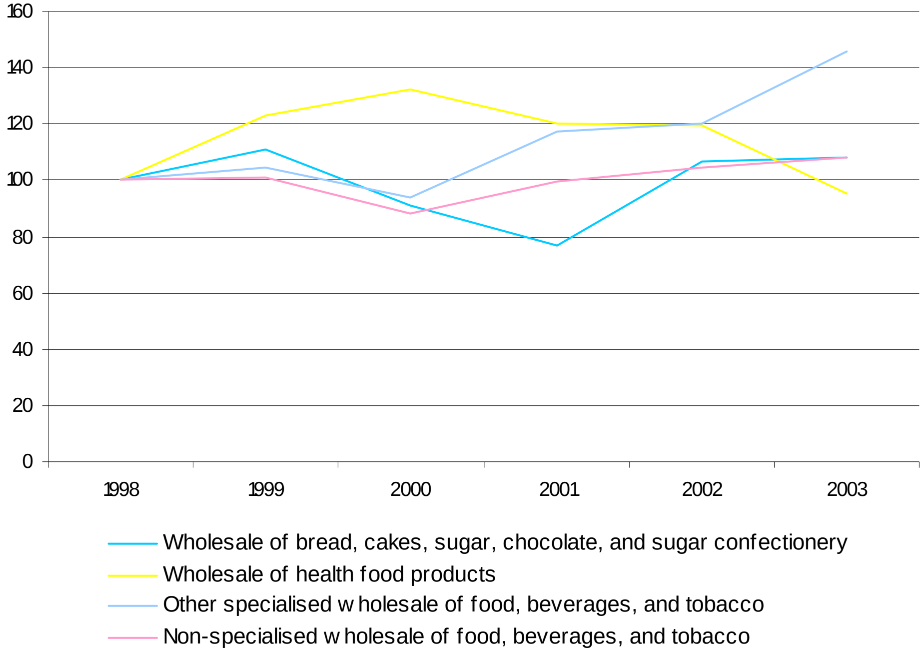


Figure 5.6. Value added: wholesale of other food (1998=100)



5.3. Retail

Aggregate real value added in food retailing increased 13% from 14.7 to 16.7 billion DKK in the period 1995-2003 (table 5.9). The increase has been steady. As is the case for shares of retail food sales, both grocers' shops and supermarkets showed a significant and steady increase in value added over time (figures 5.7-5.9), but the trend for most retail industries has been downward. Supermarkets' share of retail food value added rose from 27.6 to 41.2% of value added between 1995 and 2003.

Table 5.7. Percentage of value added: retail

Industry	% of value added 1995	2003
Grocer's shops	16,1	22,4
All-night shops	4,2	2,8
Supermarkets	27,6	41,2
Variety stores	34,5	21,7
Retail sale of fruit and vegetables	1,6	1,2
Retail sale of meat and meat products	5,0	3,8
Retail sale of fish, game, crustaceans and molluscs	1,0	0,8
Retail sale of bread, cakes and flour confectionery	0,3	0,3
Retail sale of chocolate and sugar confectionery	1,7	1,1
Retail sale of alcoholic and other beverages	0,6	0,8
Retail sale of tobacco products	6,4	2,9
Retail sale of cheese	0,5	0,3
Retail sale of health food	0,3	0,4
Other retail sale of food and beverages in specialized stores	0,2	0,3
Total value added	100	100

Although specialised food retail industries largely maintained their (very low) shares of sales, table 5.8 shows that their shares of value added have fallen significantly, from 17.6% of value added in 1995 to just 12% in 2003.

Table 5.8. Percentage of value added in specialised and non-specialised retail food industries

Aggregate industry group	% of value added 1995	2003
Unspecialised*	82,4	88,0
Specialised**	17,6	12,0
Total value added	100	100

*Grocer's shops, all-night shops, supermarkets and variety stores.
**Retail sale of fruit and vegetables, retail sale of meat and meat products, retail sale of fish, game, crustaceans and molluscs, retail sale of bread, cakes and flour confectionery, retail sale of chocolate and sugar confectionery, retail sale of alcoholic and other beverages, retail sale of tobacco products, retail sale of cheese, retail sale of health food, other retail sale of food and beverages in specialized stores8

Table 5.9. Value added: retail

Industry	1995	1996	1997	1998	1999	2000	2001	2002	2003
Grocer's shops	2.385.536	2.443.160	2.666.830	2.739.858	2.932.639	3.276.027	3.334.509	3.544.403	3.735.347
All-night shops	627.404	611.673	570.574	625.109	576.077	531.417	535.195	529.369	459.504
Supermarkets	4.072.744	3.948.569	4.147.248	7.385.956	7.604.383	6.902.711	6.971.172	6.976.020	6.871.667
Variety stores	5.097.585	5.157.126	5.458.679	2.931.197	3.233.624	3.468.227	3.469.956	3.490.896	3.626.611
Retail sale of fruit and vegetables	234.601	216.865	213.466	220.432	207.366	186.967	180.506	199.518	208.239
Retail sale of meat and meat products	738.072	725.013	715.694	789.805	752.389	729.941	668.938	647.475	642.259
Retail sale of fish, game, crustaceans and molluscs	140.798	141.050	143.199	150.787	159.024	158.578	146.257	142.055	135.969
Retail sale of bread, cakes and flour confectionery	49.470	62.750	52.029	50.636	49.006	51.781	48.969	43.999	41.746
Retail sale of chocolate and sugar confectionery	253.871	265.375	253.550	246.504	239.630	228.229	192.477	181.771	191.323
Retail sale of alcoholic and other beverages	85.036	84.170	100.697	107.855	118.264	120.423	109.643	110.751	128.965
Retail sale of tobacco products	940.334	823.706	942.234	825.575	569.170	723.100	591.093	515.926	484.597
Retail sale of cheese	71.155	69.410	63.996	65.023	62.790	59.647	52.828	51.829	55.387
Retail sale of health food	49.866	43.286	48.539	48.635	46.489	46.286	50.281	54.029	64.822
Other ret. sale of food & beverages in spec. stores	34.475	32.131	29.016	24.592	33.484	32.862	29.681	38.424	44.659
Total value added	14.780.949	14.624.283	15.405.752	16.211.965	16.584.336	16.516.196	16.381.505	16.526.465	16.691.096

Note: 1000DKK, current prices, deflated with net index. Note: After 2002 grocer’s shops and discount stores are divided. Discount stores have been added to grocer’s shops.

Figure 5.7. Value added: retail of fruit and vegetables, fish, drinks, coffee, and tobacco (1995=100)

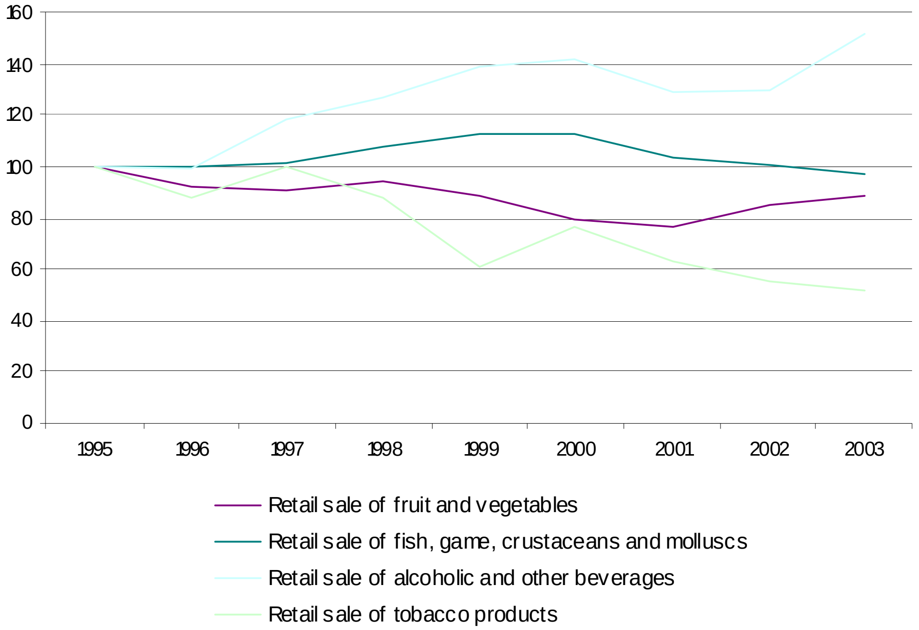


Figure 5.8. Value added: specialised retail of meat and dairy (1995=100)

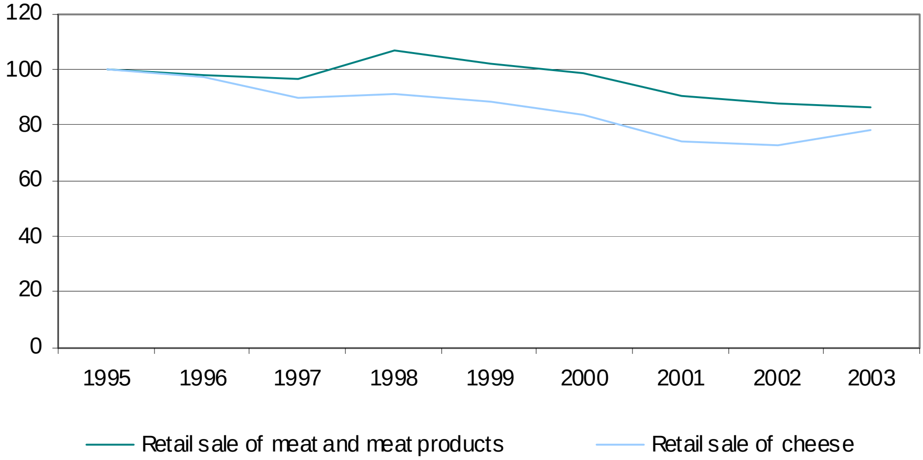
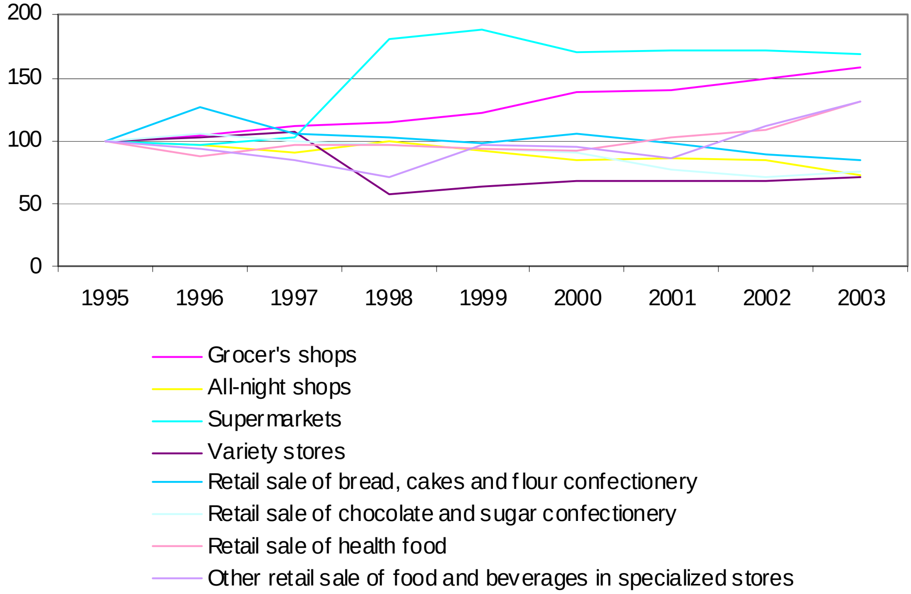


Figure 5.9. Value added: retail of other food (1995=100)

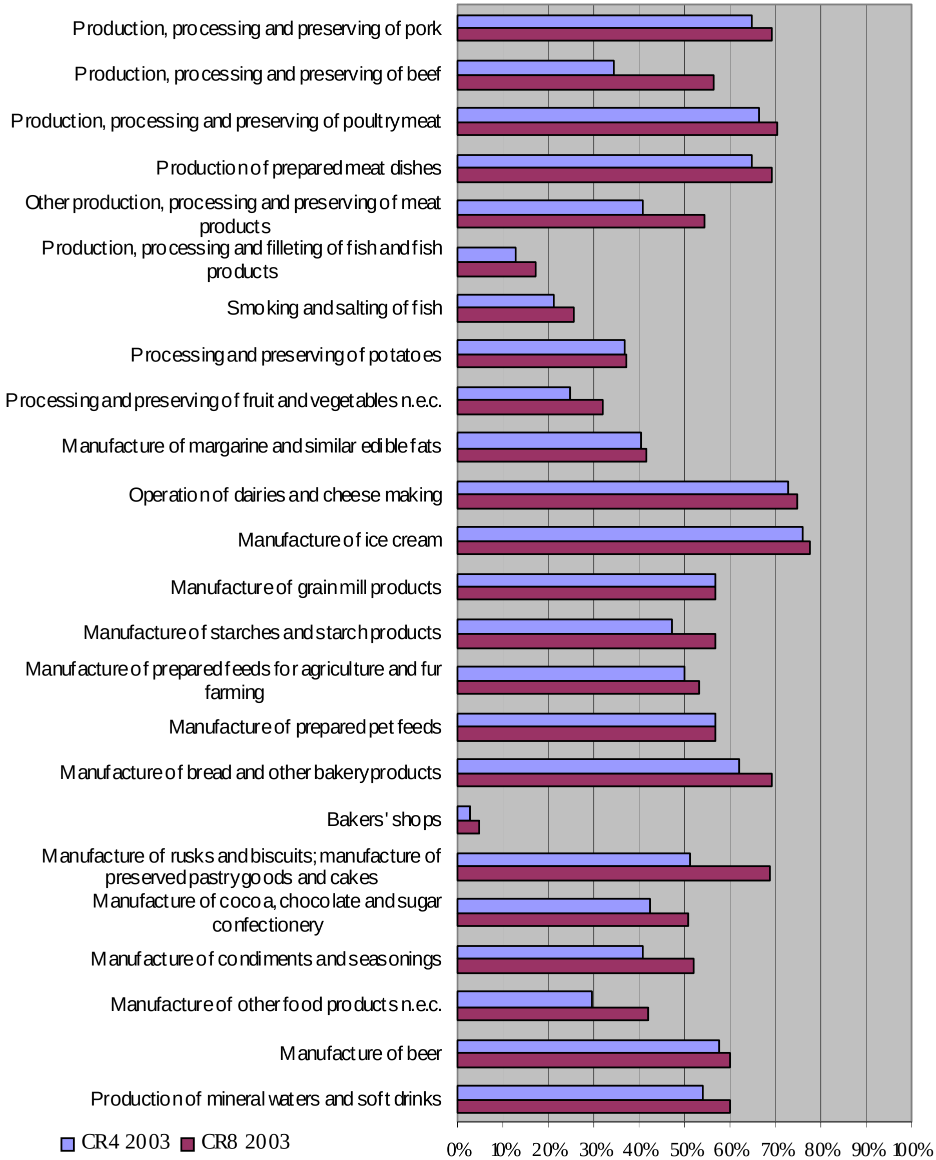


6. Concentration ratios: CR_4 and CR_8

6.1. Processing

For 2003, a number of food processing industries exhibited a CR_4 above 60% (see figure 6.1). Industries with low CR_4 include bakeries, fish processing, and fruit and vegetable processing. It is notable that such industries as condiments and seasonings, manufacture of other food products not elsewhere included, and pet foods all appear to be concentrated. Another notable feature of figure 6.1 is the generally small difference between CR_4 and CR_8 measures, which implies a large size differential between the largest few firms and the size of the firms ranked 5-8 by market shares. Only in beef processing does this difference exceed 10% of the market and in many cases (e.g. pork, poultry and dairy) CR_4 and CR_8 are almost equal.

Figure 6.1. CR_4 and CR_8: processing



Note: Manufacture of other food products n.e.c. from 2002, not 2003.

Figures 6.2-6.5 chart the development of CR_4 over time. Although the measures are generally constant over time, there are system-wide variations in concentration measures for fruit and vegetable processing, and beer and fish processing. In industries associated with meat and dairy (figure 6.3), there are apparent declines in concentration for beef and a few other products, and a slight decline for pork.

Figure 6.2. CR_4: processing of fruit and vegetables, fish, drinks, coffee, and tobacco

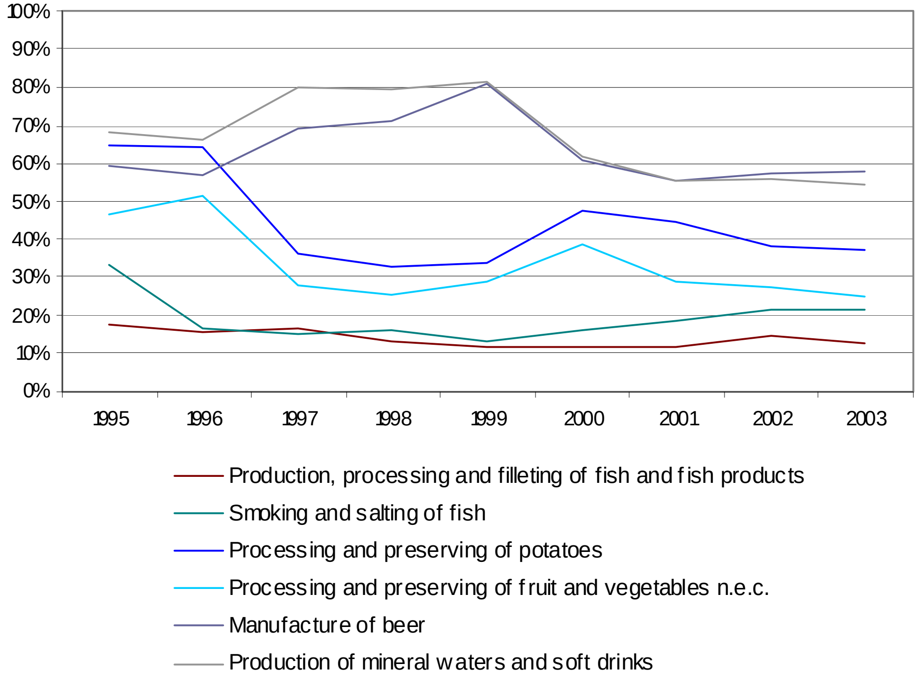


Figure 6.3. CR$_4$: processing of meat and dairy

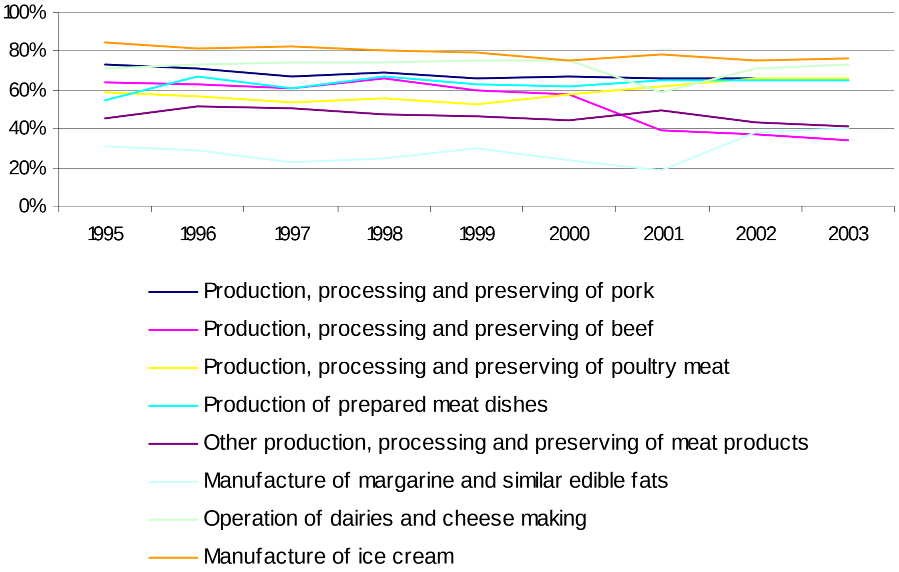
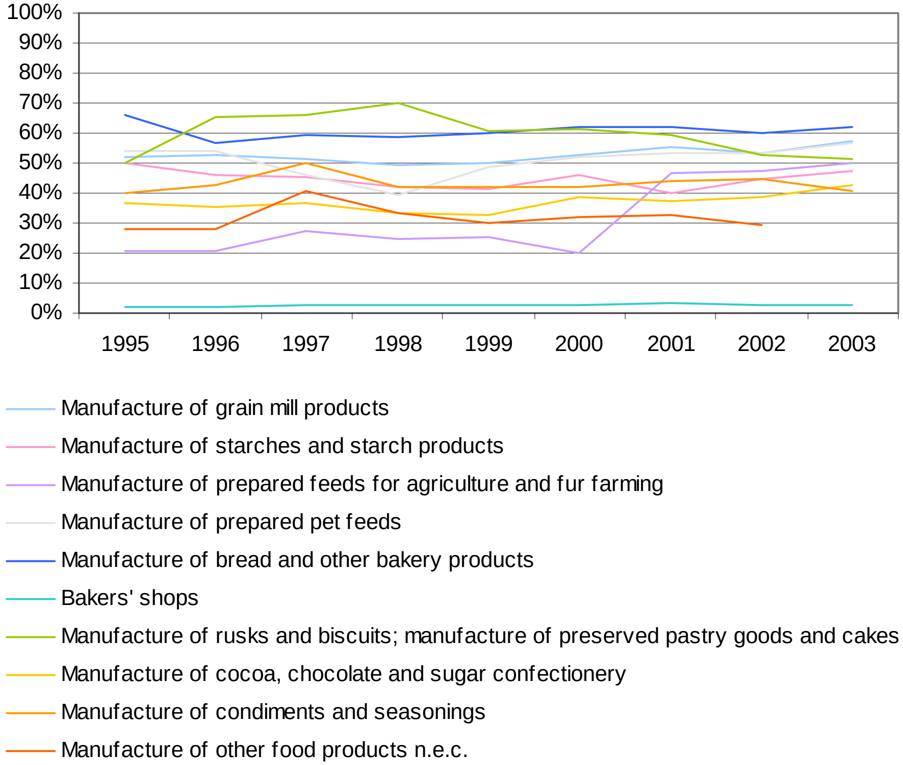


Figure 6.4. CR$_4$: processing of other food

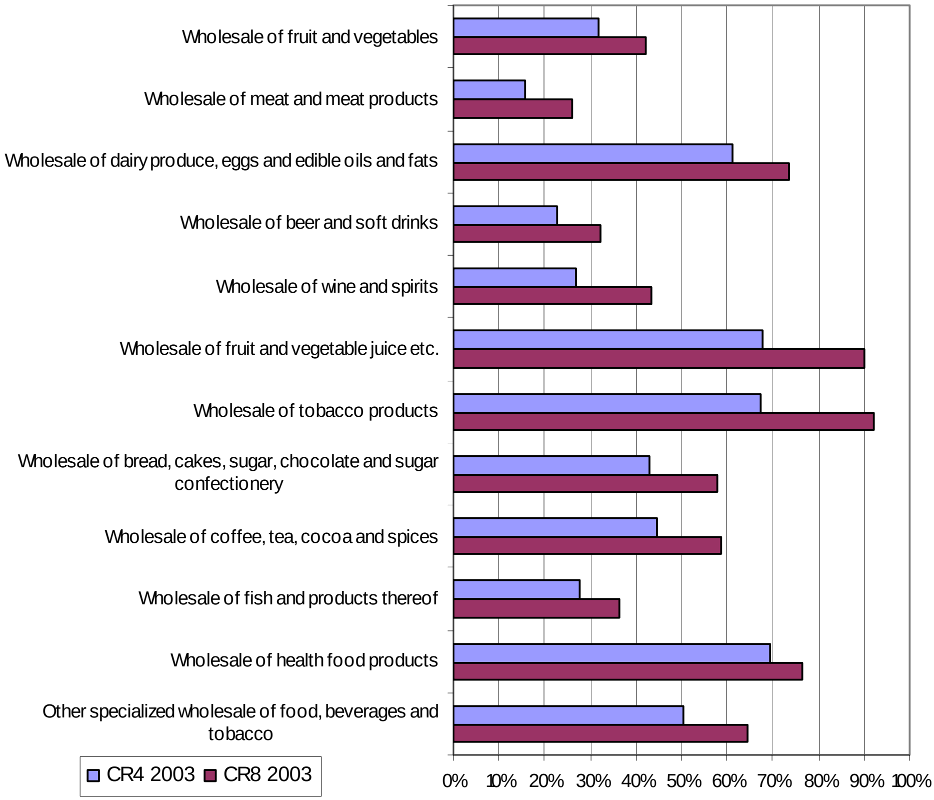


Note: Manufacture of other food products n.e.c. 2003 has been deleted as an outlier.

6.2. Wholesale

The wholesale food industries are also highly concentrated, with several industries' CR_4 exceeding 60% (see figure 6.5). Notably, meat product wholesaling appears rather non-concentrated, although dairy, eggs and fats, and fruit and vegetable wholesaling are highly concentrated. It is notable that health food wholesaling is highly concentrated (CR_4 about 70%). As for food processing, the relative lack of importance of firms ranked 5-8 in market share is quite apparent. Data are not available on concentration amongst unspecialised food wholesalers.

Figure 6.5. CR_4 and CR_8: wholesale



Trends in food wholesale concentration are displayed in figures 6.6-6.8. In general, there was a slight decline in concentration in most food wholesale industries in the period 1995-2003.

Figure 6.6. CR_4: wholesale of fruit and vegetables, fish, drinks, coffee, and tobacco

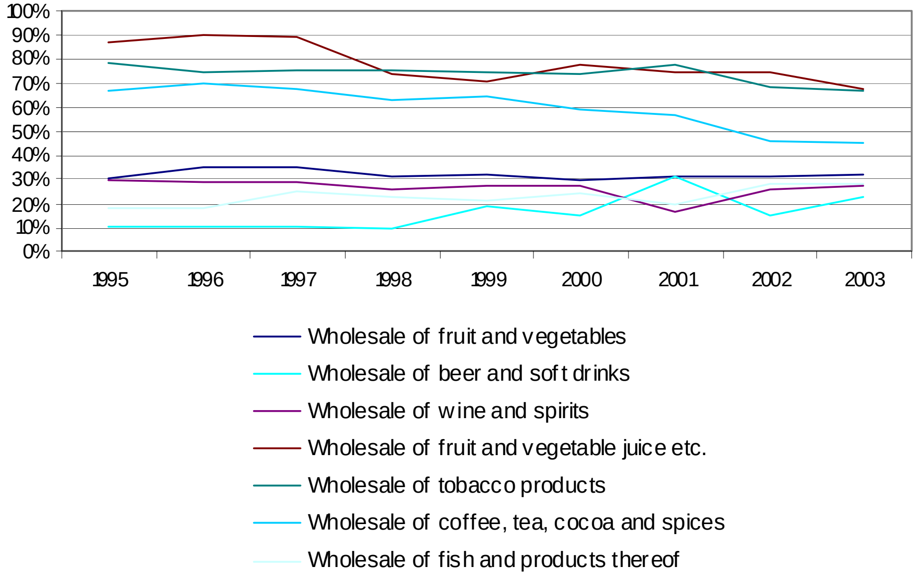


Figure 6.7. CR$_4$: wholesale of meat and dairy

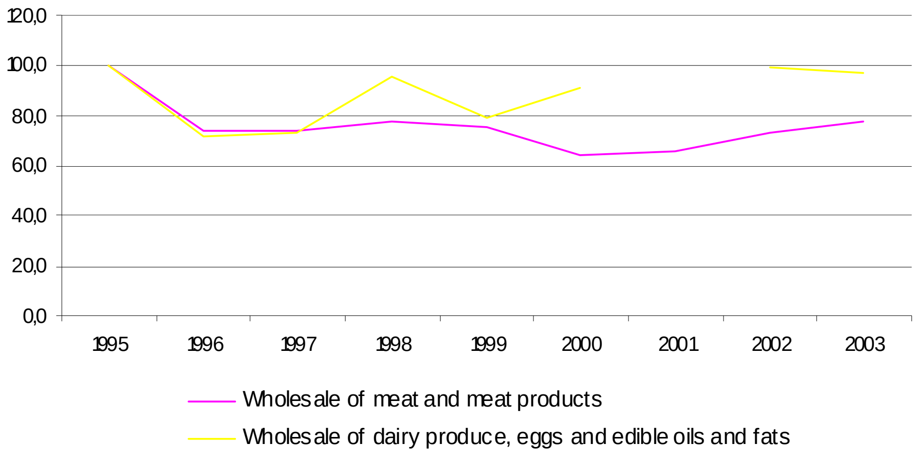
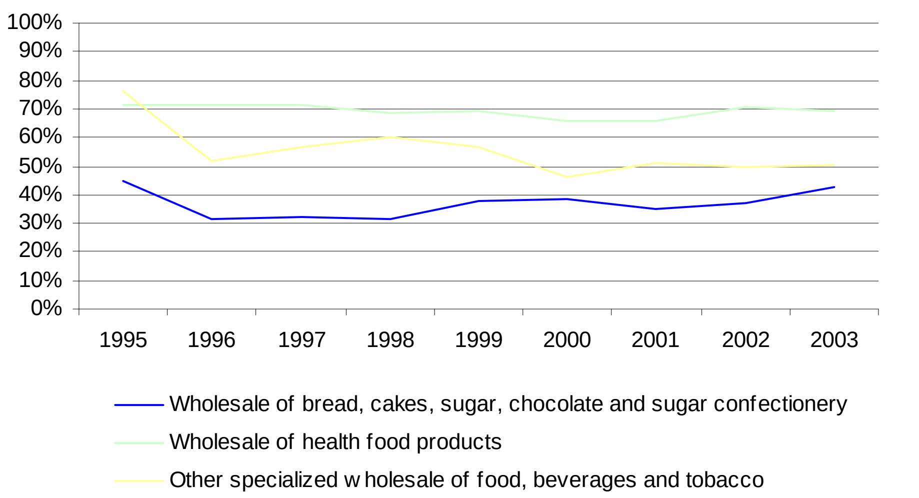


Figure 6.8. CR$_4$: wholesale of other food



6.3. Retail

Data obtained from *Statistics Denmark* do not include measures of concentration for unspecialised food retailers. Despite substantial consolidation in the period 1995-

2003, concentration in specialised food retail industries is rather low (see figure 6.9), with the most concentrated industry (confectionery) exhibiting a CR_4 of just 35%. The relative magnitudes of CR_4 and CR_8 also indicate a much less concentrated environment. Figures 6.10-6.12 depict the path of CR_4 in food retailing 1995-2003. In most cases CR_4 is largely constant.

Figure 6.9. CR_4: specialist retail

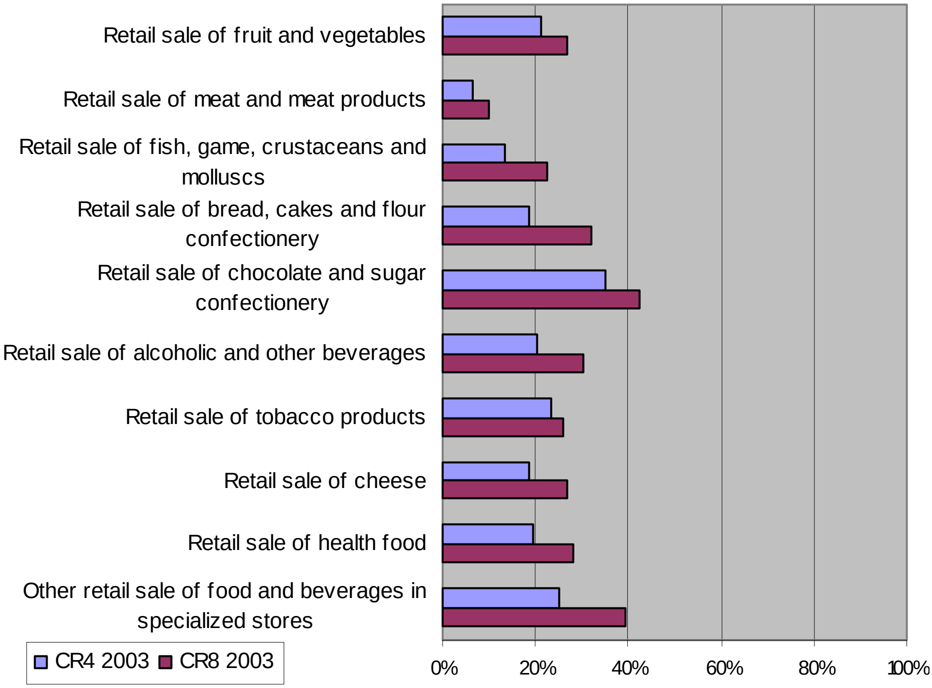


Figure 6.10. CR4: specialist retail of fruit and vegetables, fish, drinks, coffee, and tobacco

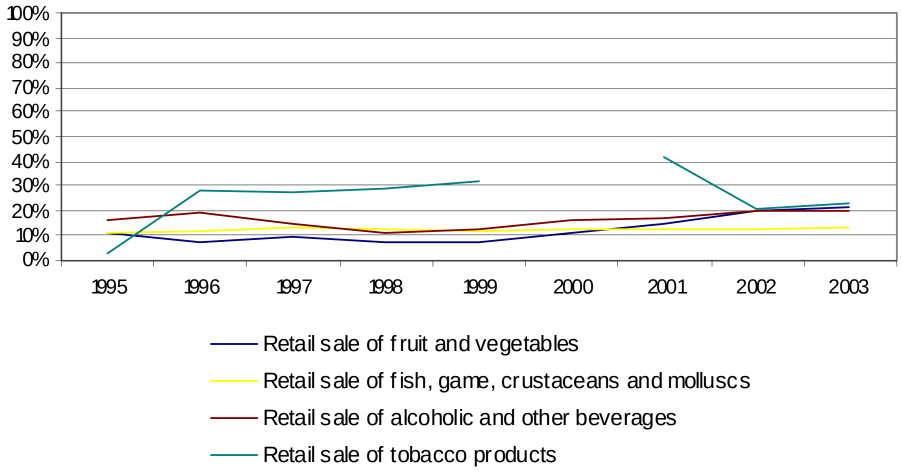


Figure 6.11. CR4: specialist retail of meat and dairy

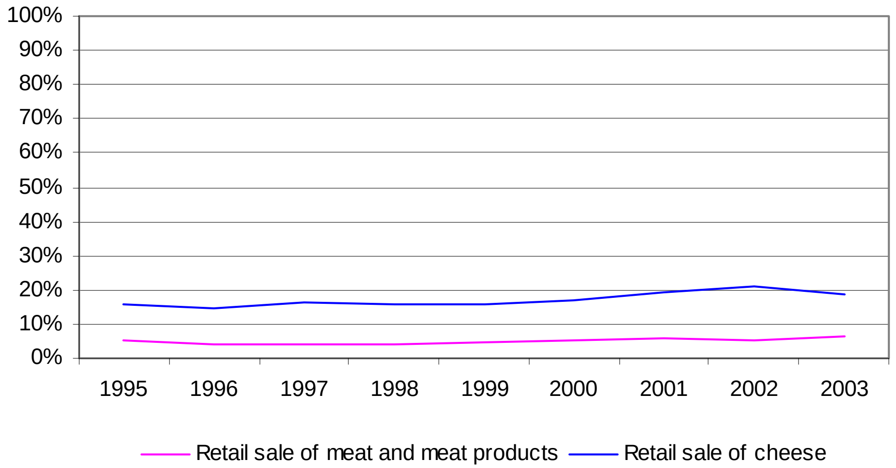
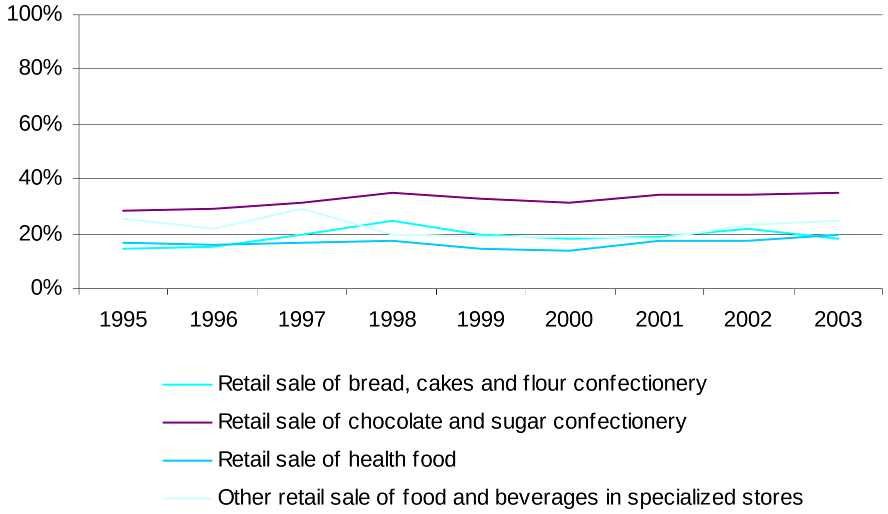


Figure 6.12. CR_4: specialist retail of other food

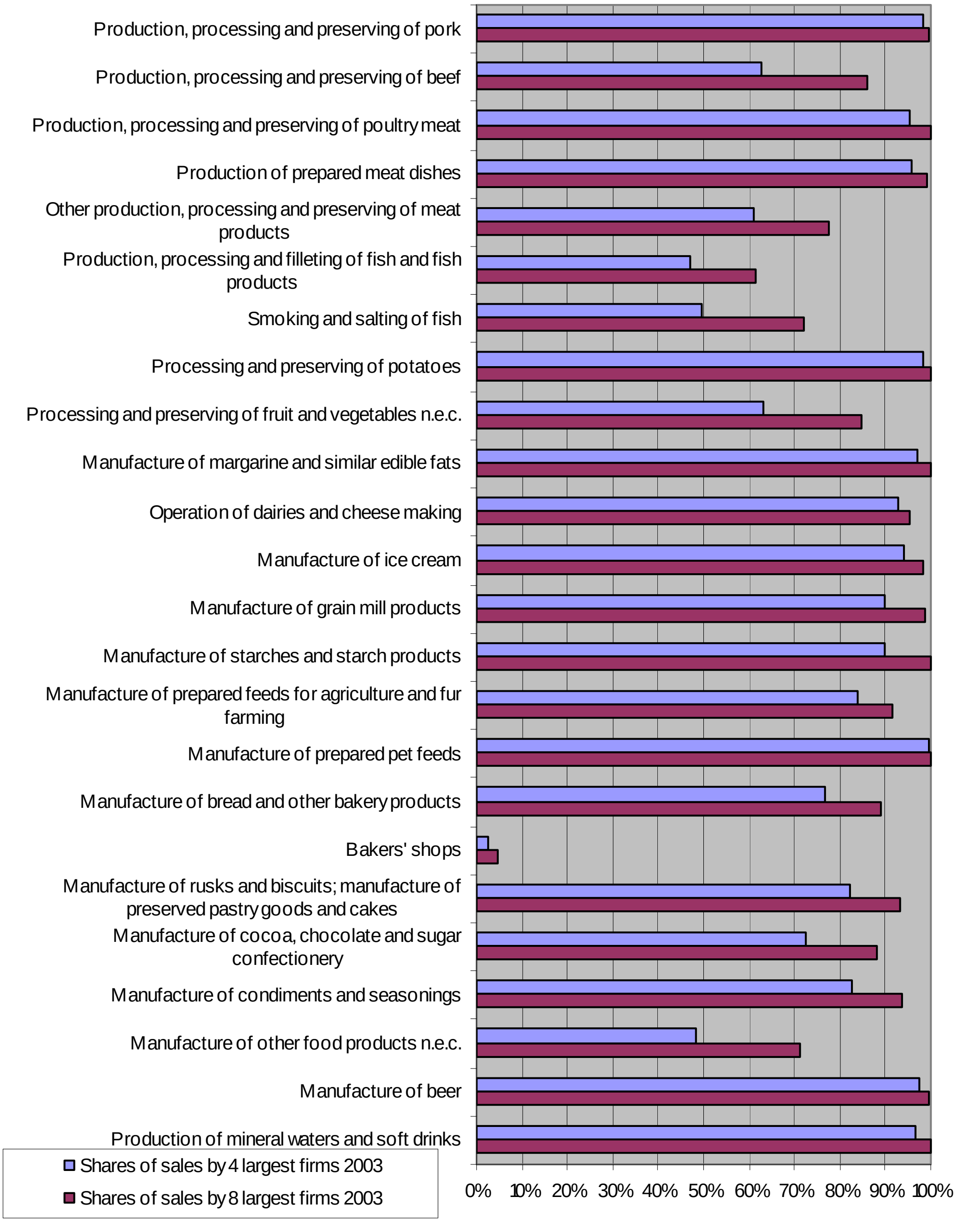


7. Sales concentration

7.1. Processing

Over 90% of sales originate from just four firms in most of the food processing industries investigated (see figure 7.1). The figure lies close to 100% for many industries, such as pork and poultry processing and prepared meats, potato processing, dairy and ice cream manufacture, oils and fats processing, grain milling, and beer and other beverages. As with CR_4 and CR_8 measures, the difference in share of sales held by the top four and eight firms is minimal.

Figure 7.1. Shares of sales held by 4 and 8 largest firms by sales: processing



Note: Manufacture of food products n.e.c. from 2002, not 2003.

Figures 7.2-7.5 present the path of sales shares of the top four firms over the period 1995-2003. For the most part, there has been little change, although poultry meat processing has become more concentrated and beef processing far less so.

Figure 7.2. Shares of sales held by 4 largest firms by sales: processing of fruit and vegetables, fish, drinks, coffee, and tobacco

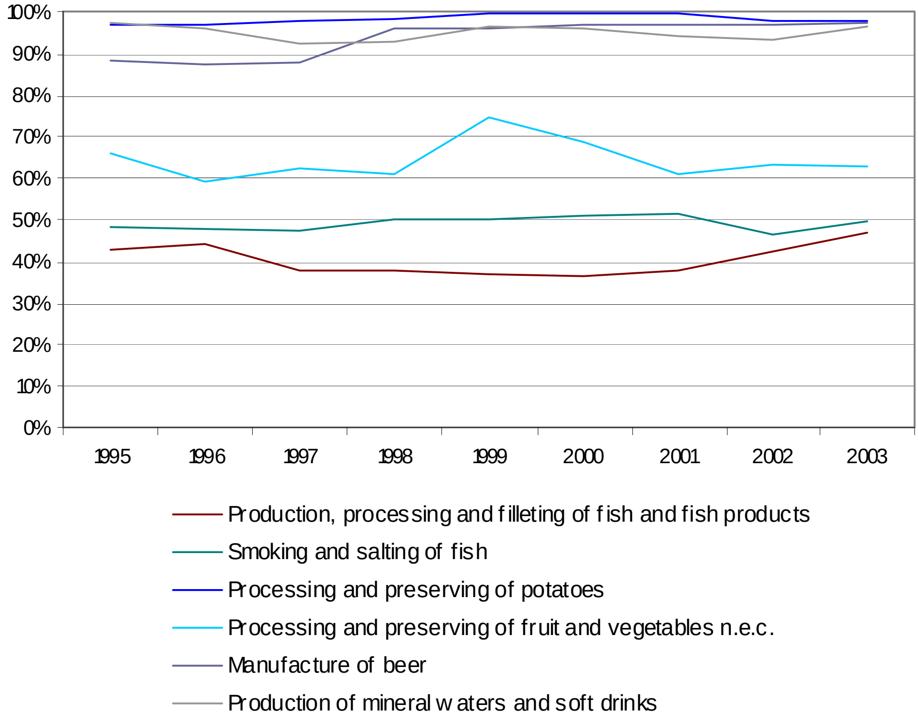


Figure 7.3. Shares of sales held by 4 largest firms by sales: processing of meat and dairy

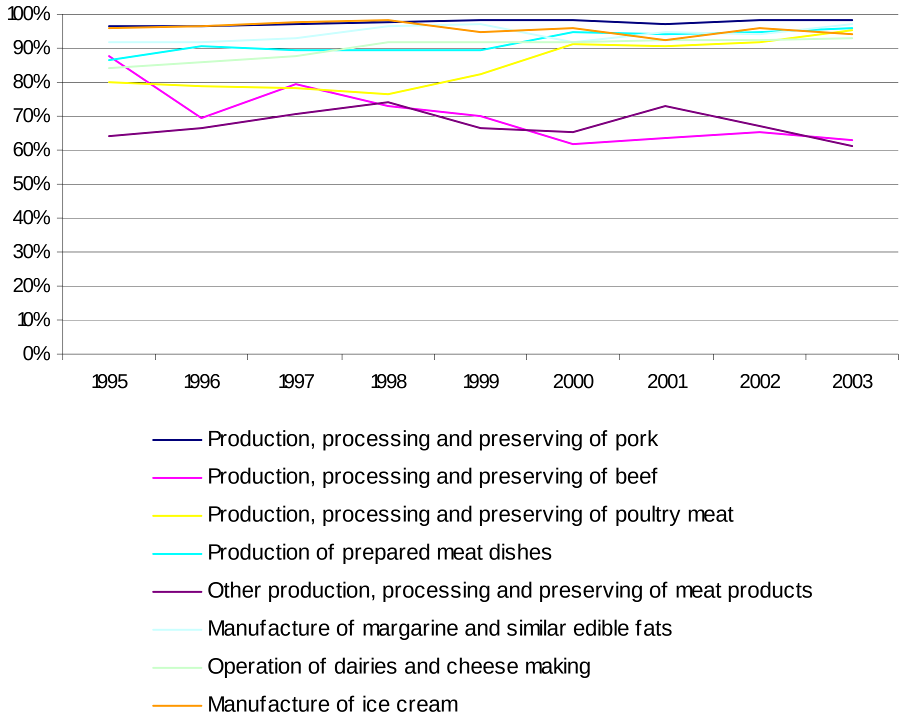
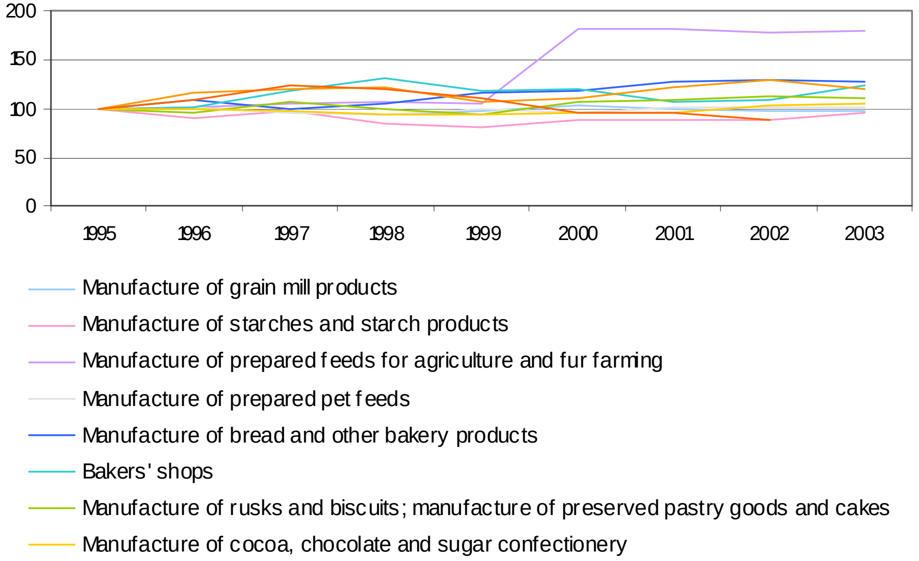


Figure 7.4. Shares of sales held by 4 largest firms by sales: processing of food

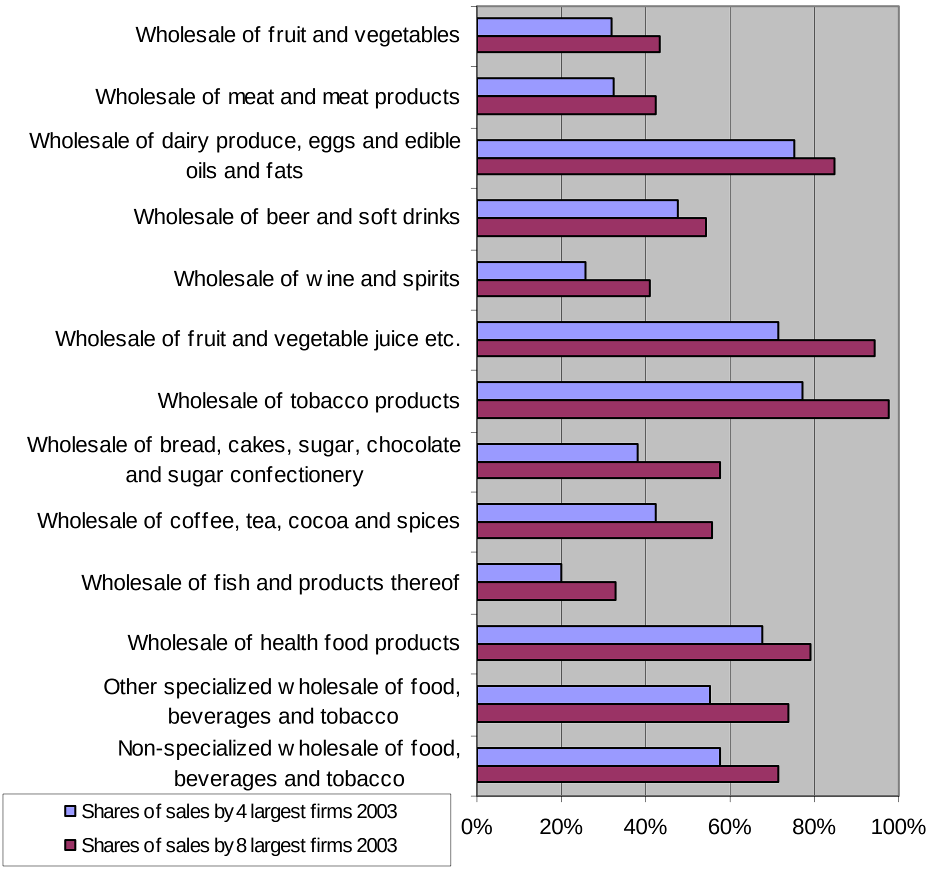


Note: Manufacture of food products n.e.c. 2003 has been deleted as an outlier.

7.2. Wholesale

In terms of sales shares, food wholesaling is less concentrated than food processing. The largest four firms sell 70-80% of total industry sales in the cases of wholesale of dairy, eggs and oils and fats, vegetable juices, tobacco products, and health foods. It is notable that the top four fish wholesaling firms occupy just 20% of total sales, and relatively small shares of sales are held by the four largest firms in beverage wholesaling, and in meats and vegetables wholesaling (figure 7.5).

Figure 7.5. Shares of sales held by 4 and 8 largest firms by sales: wholesale



Figures 7.6-7.8 report change in the period 1995-2003. Several industries feature a steady increase in the share of sales held by the top 4 firms (wholesale of dairy products, eggs and fats, and wholesale of beer and soft drinks) but there are also substantial declines (wholesale of tea and coffee, meat and meat products, and bakery products).

Figure 7.6. Shares of sales held by 4 largest firms by sales: wholesale of fruit and vegetables, fish, drinks, coffee, and tobacco

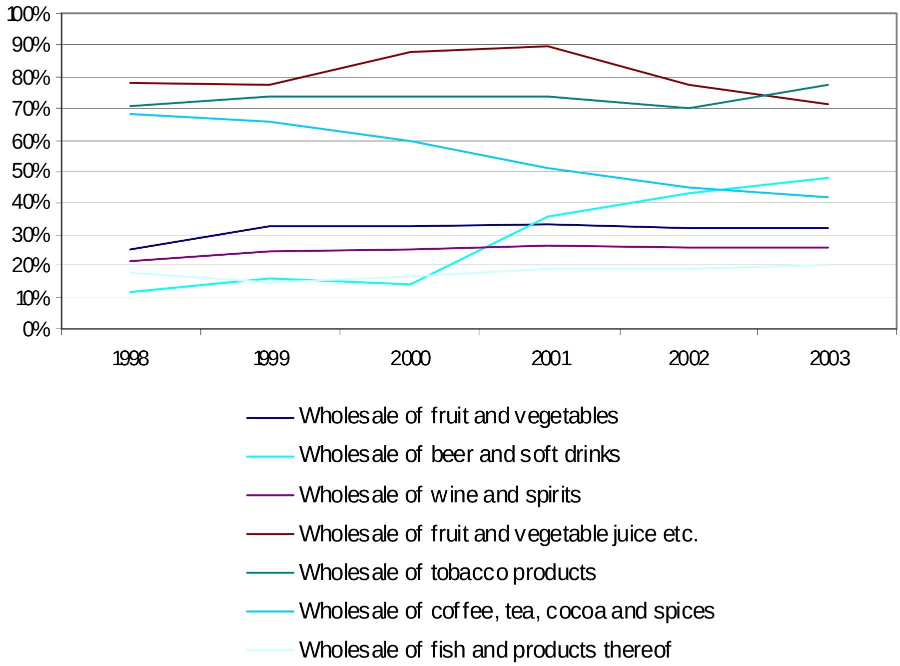


Figure 7.7. Shares of sales held by 4 largest firms by sales: wholesale of meat and dairy

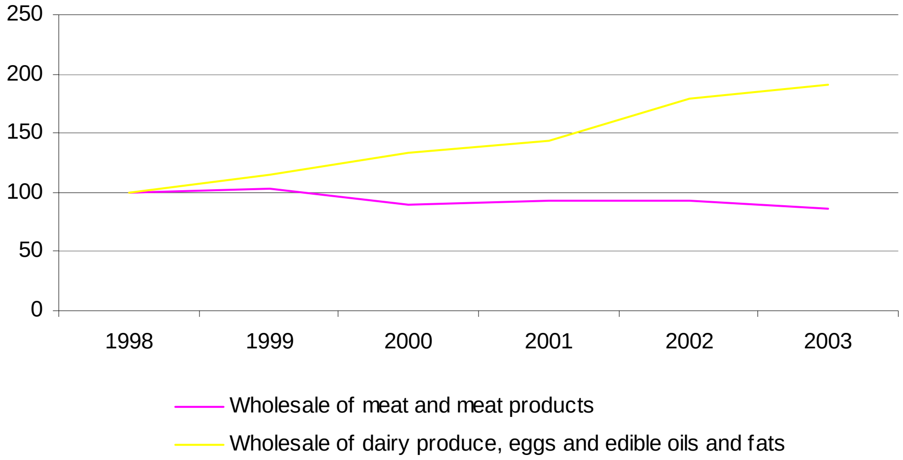
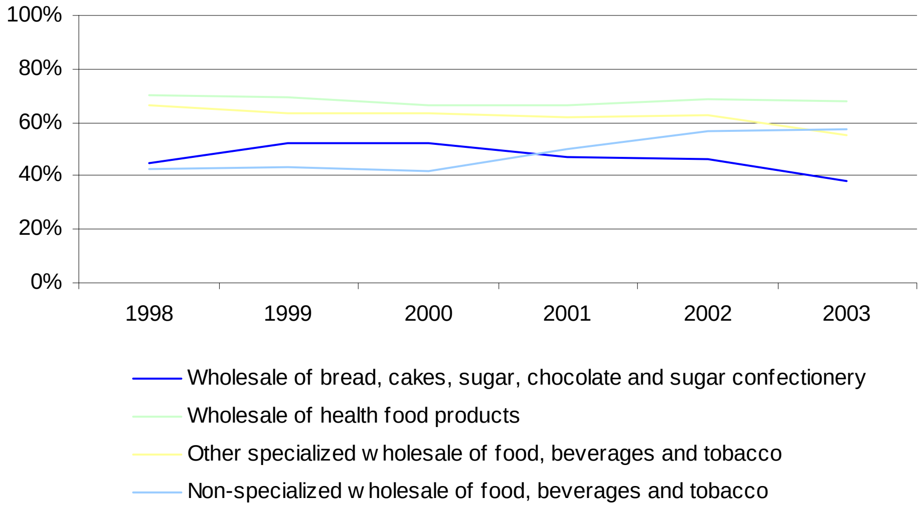


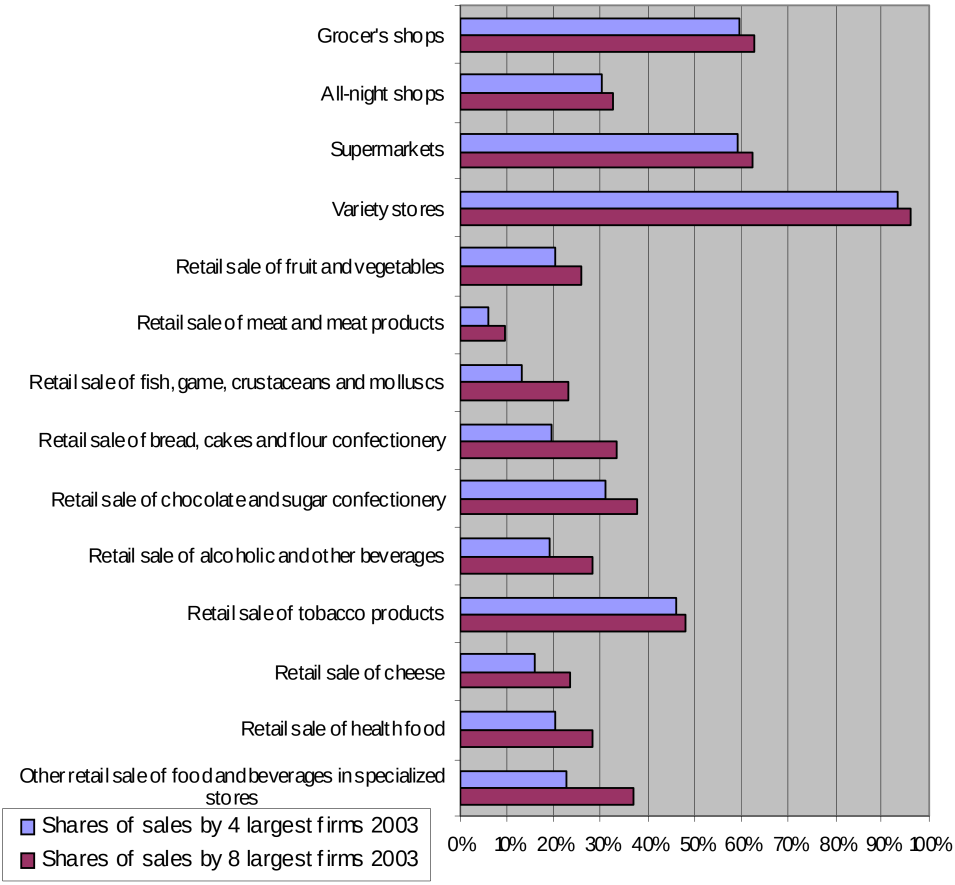
Figure 7.8. Shares of sales held by 4 largest firms by sales: wholesale of other food



7.3. Retail

The top four supermarket firms held a 60% share of all supermarket sales in 2003 (figure 7.9). Aside from variety stores (92%) and grocery stores (45%), retail food industries appear relatively un-concentrated: in most industries the top four firms have less than 20% of sales. For the less concentrated food retail industries (which tend to be the specialised ones) the share of sales held by the eight largest firms is 50-100% larger than the same measure for the eight largest firms. This is further indication of a relatively un-concentrated industrial sector.

Figure 7.9. Shares of sales held by 4 and 8 largest firms by sales: retail



Note: Grocer's shops and all-night shops from 2002, not 2003.

Figures 7.10-7.12 reveal no consistent patterns of change since 1995, although top-4 firms' shares of sales in supermarkets have climbed in an erratic manner (figure 7.12).

Figure 7.10. Shares of sales held by 4 largest firms by sales: retail of fruit and vegetables, fish, drinks, coffee, and tobacco

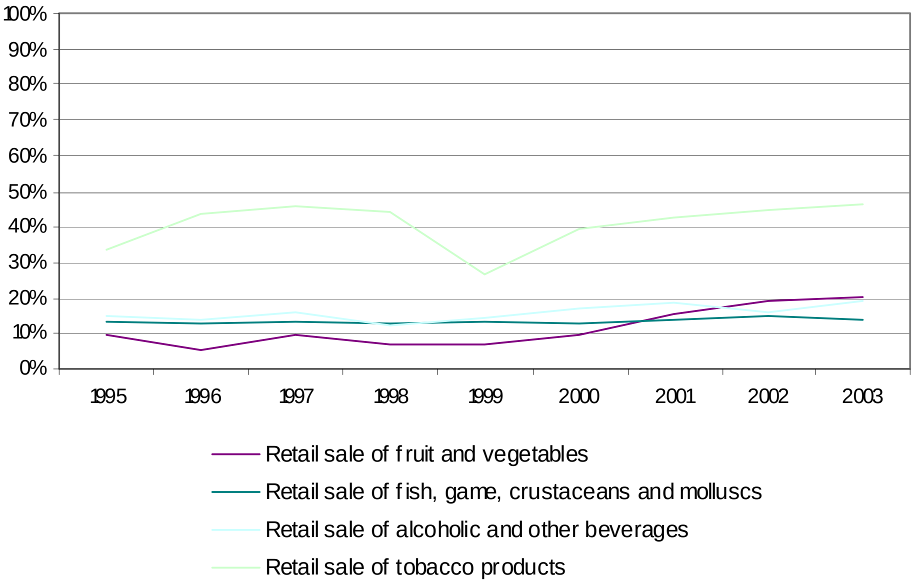


Figure 7.11. Shares of sales held by 4 largest firms by sales: retail of meat and dairy

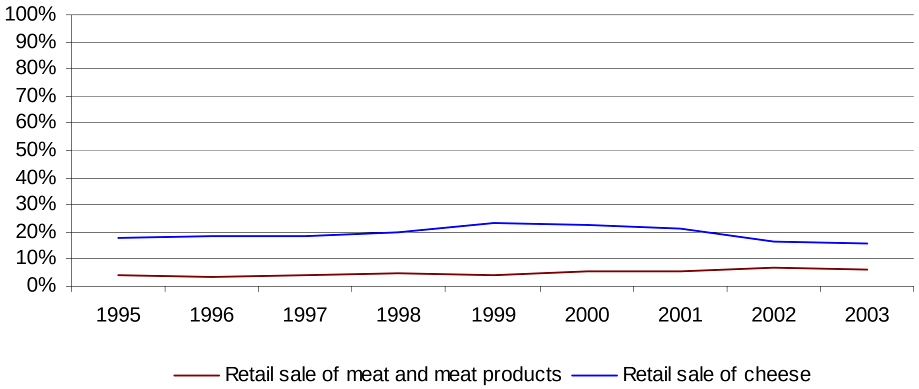
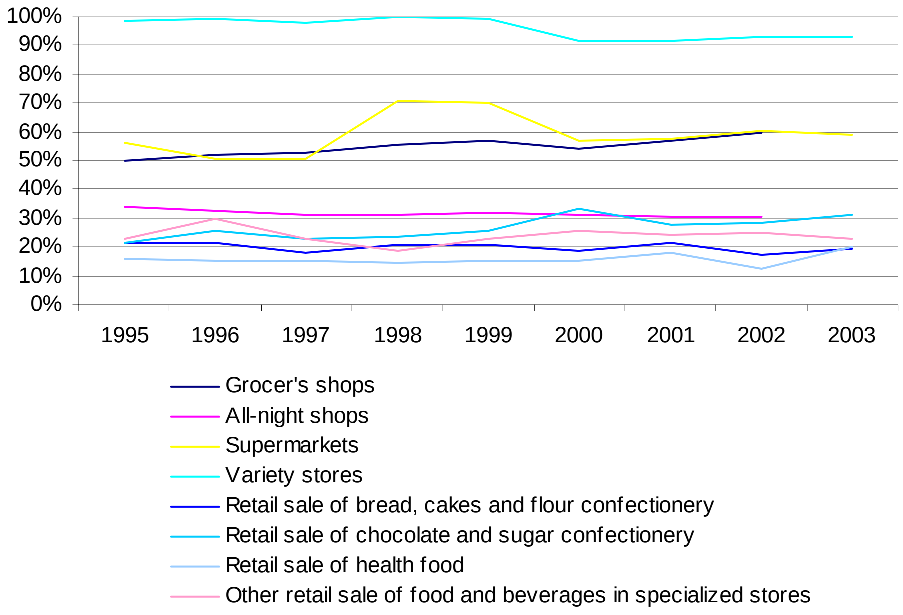


Figure 7.12. Shares of sales held by 4 largest firms by sales: retail of food



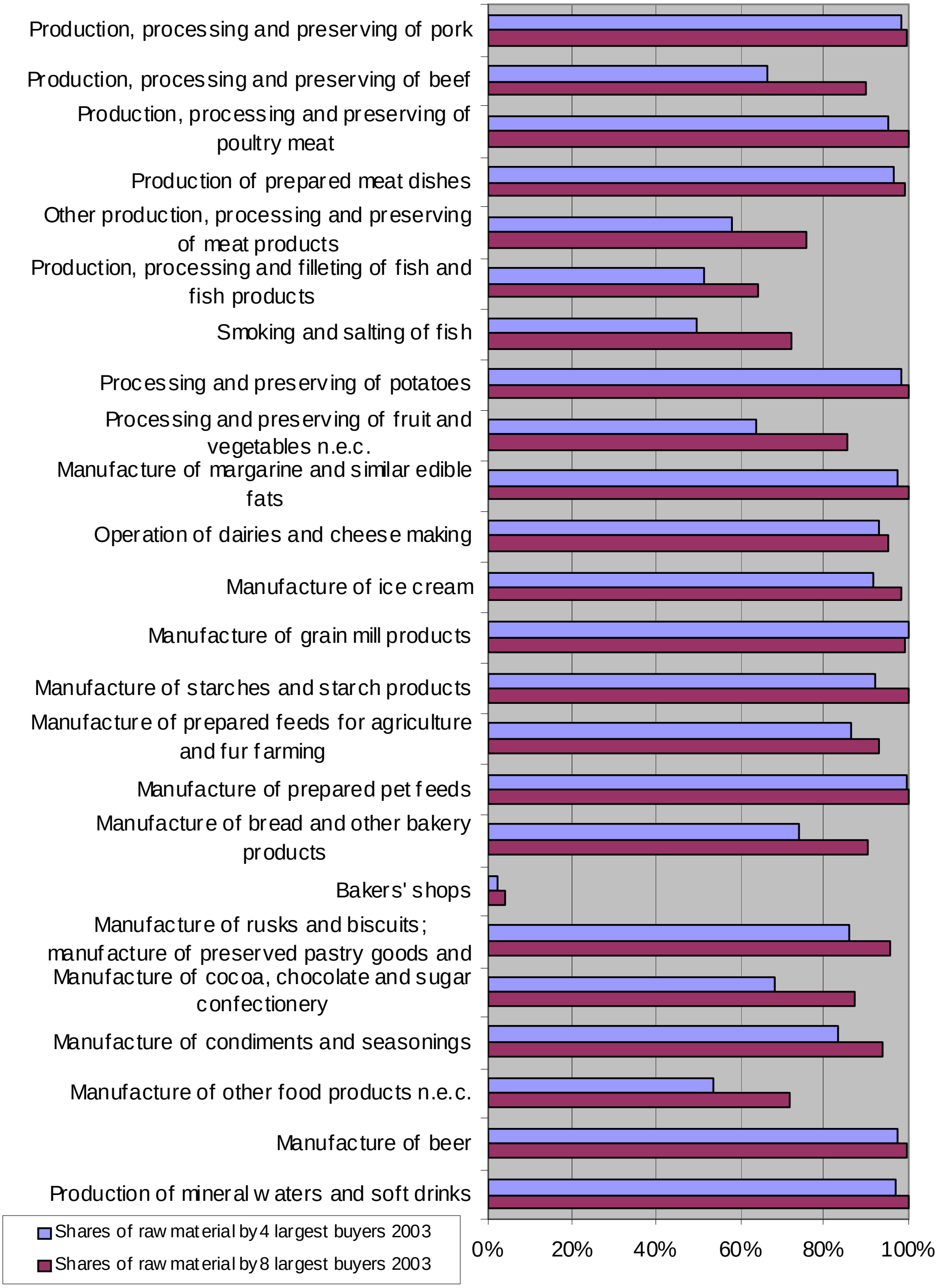
Note: Grocer's shops and All-night shops 2003 have been deleted as outliers.

8. Concentration in raw materials purchases

8.1. Processing

Purchase of raw materials by Danish food processors is highly concentrated. Over 80% shares are held by the top 4 firms in 15 of the 24 industries presented in figure 8.1. In general, the less concentrated industries (beef, fish and fruit and vegetable processing) feature a larger gap between top-4 and top-8 market shares than do the more concentrated ones.

Figure 8.1. Shares of raw material held by the largest buyers of raw material: processing



Note: Manufacture of other food products n.e.c. from 2002, not 2003.

In the period 1995-2003 there has been erratic development in these measures (figures 8.2-8.4), but with few industries showing distinct trends. Sourcing of raw material in beef processing is one exception (about 30 percentage points' decline in the share of purchases held by the top 4 firms), and poultry processing (the opposite effect to beef) is another.

Figure 8.2. Shares of raw material held by 4 largest buyers of raw material: processing of fruit and vegetables, fish, drinks, coffee, and tobacco

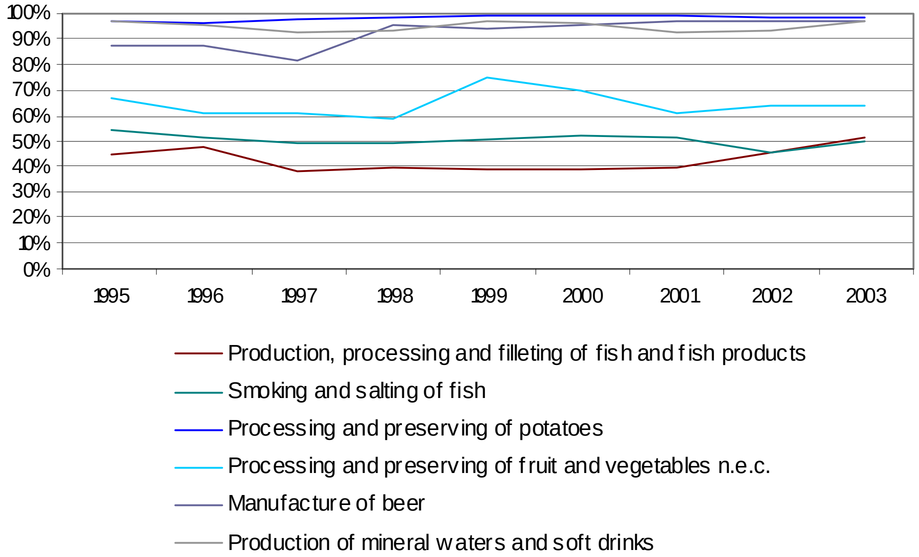


Figure 8.3. Shares of raw material held by 4 largest buyers of raw material: processing of meat and dairy

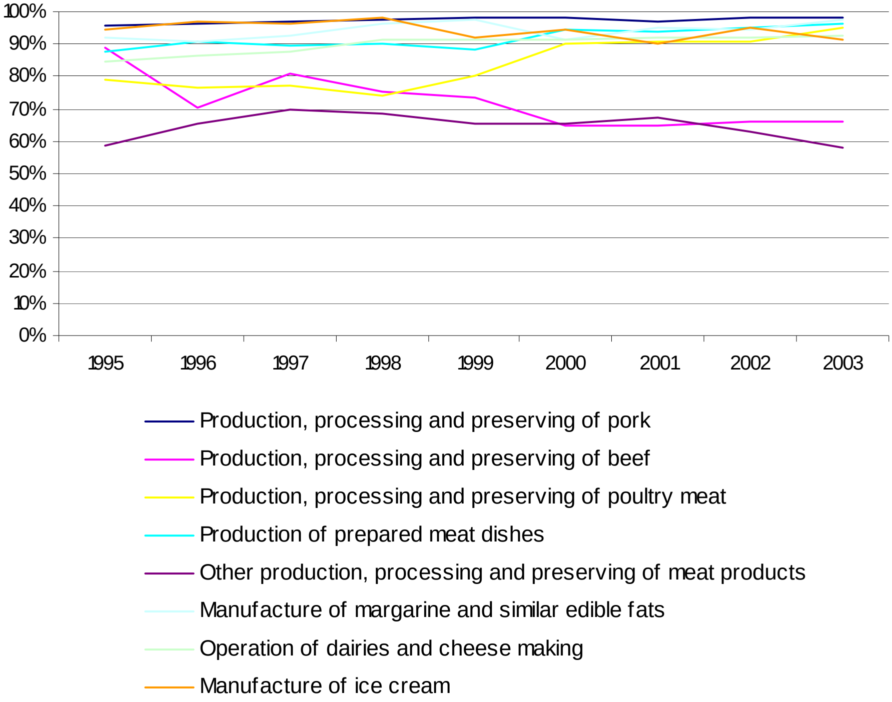
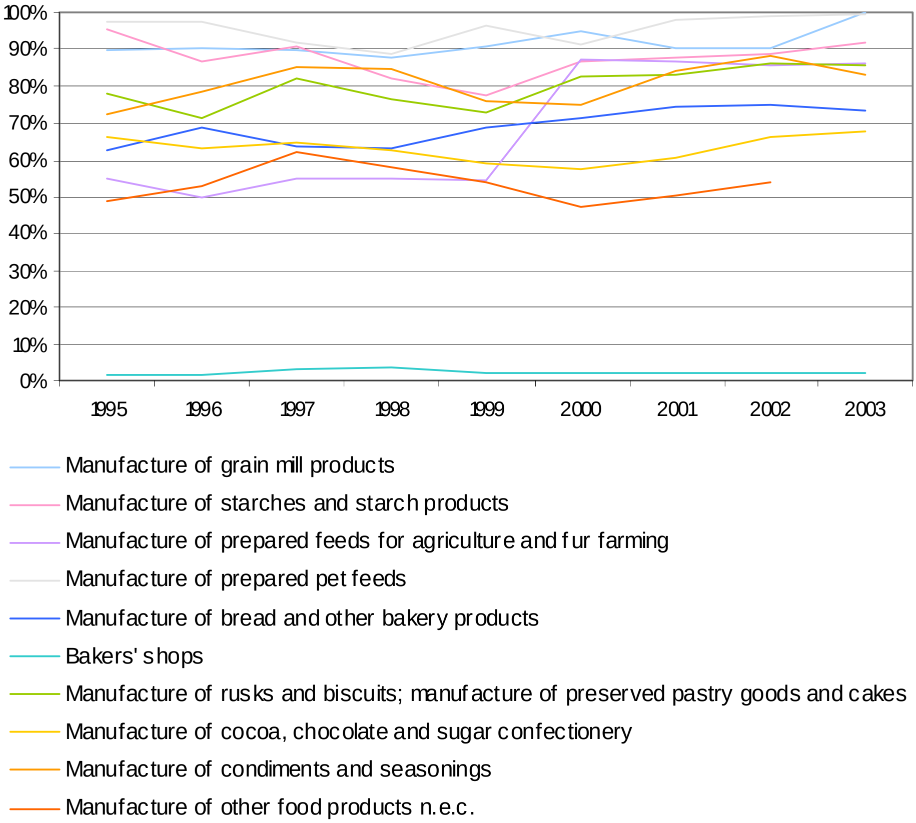


Figure 8.4. Shares of raw material held by 4 largest buyers of raw material: processing of food

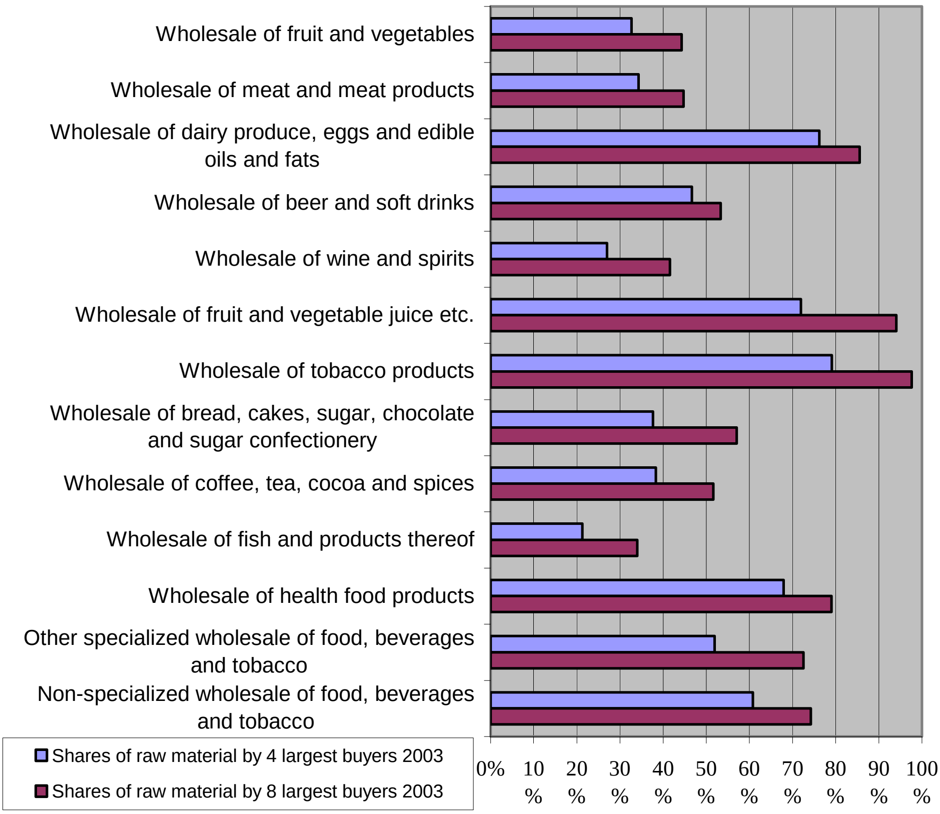


Note: Manufacture of other food products n.e.c. 2003 has been deleted as an outlier.

8.2. Wholesale

As for other measures of wholesale concentration, the top-4 and top-8 shares of purchases of raw material are at lower levels than for the food processing sector. The highest measures for input-side concentration are seen for wholesale of dairy, eggs and oils, wholesale of vegetable juice, tobacco products, and health food products (figure 8.5). The lowest input-side concentration appears to be for wine and spirits and for fish, and it is notable that wholesale purchasing of meat and fruits and vegetables also record rather low values (30-40% purchased by the top 4 firms).

Figure 8.5. Shares of raw material held by 4 and 8 largest buyers of raw material: wholesale



Figures 8.6.-8.8 present some distinct trends. In the period 1995-2003, Input concentration has become more pronounced in the cases of beer and soft drinks and wholesale of dairy, eggs and oils (a doubling of concentration to almost 80%). The opposite trend is observed for bread and cakes, and of tea and coffee. The purchasing side of wholesale of fruits and vegetables appears to have fluctuated in its concentration, and remains at about 70%.

Figure 8.6. Shares of raw material held by 4 largest buyers of raw material: wholesale of fruit and vegetables, fish, drinks, coffee, and tobacco

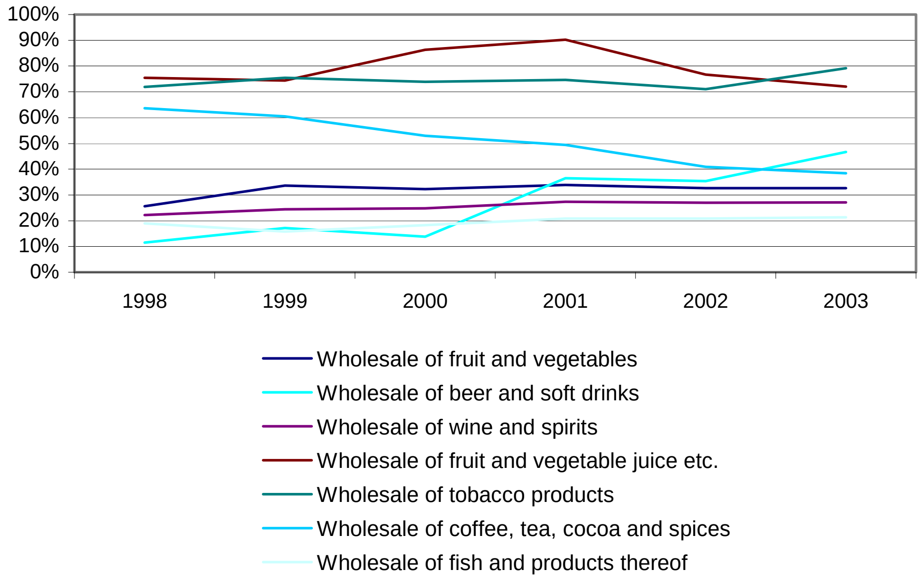


Figure 8.7. Shares of raw material held by 4 largest buyers of raw material: wholesale of meat and dairy

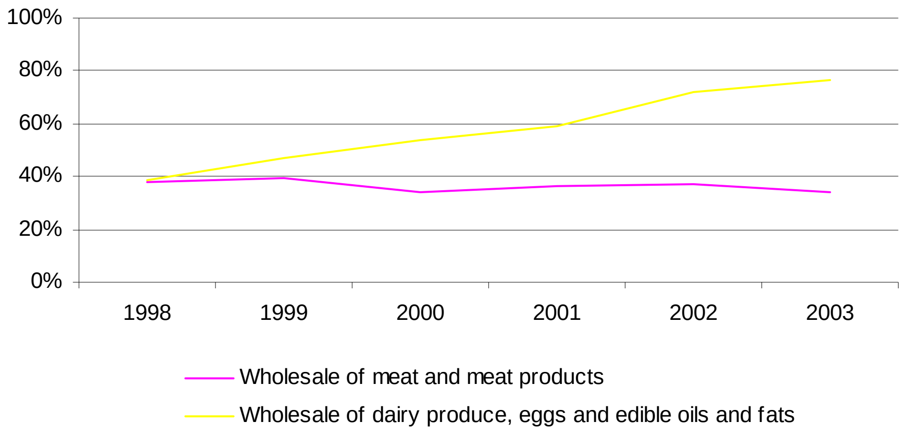
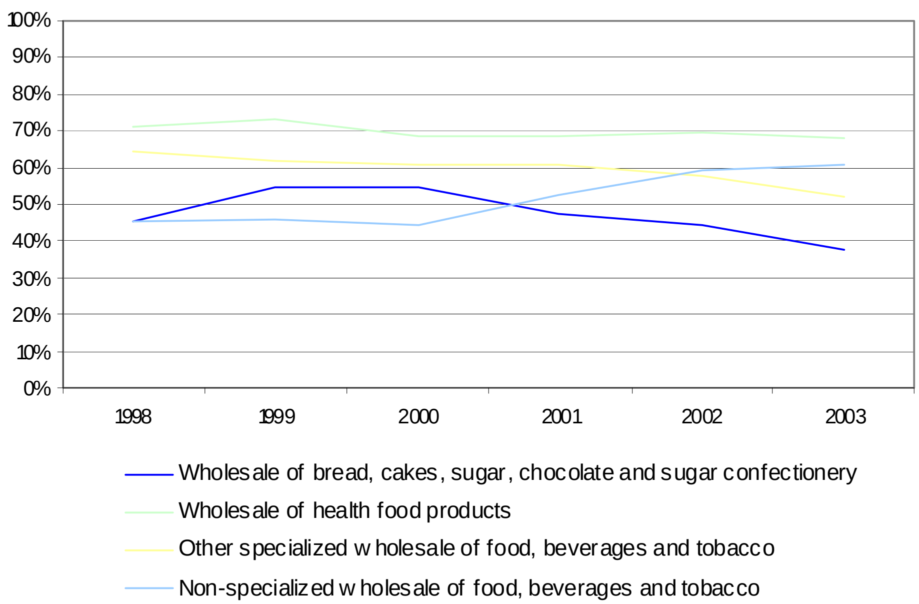


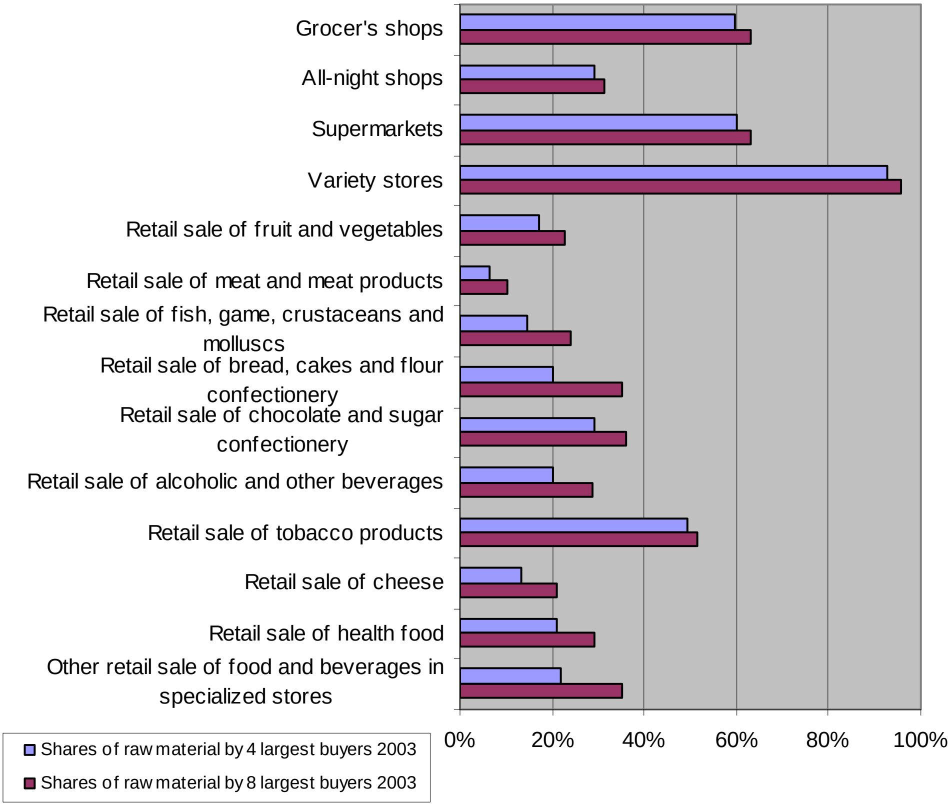
Figure 8.8. Shares of raw material held by 4 largest buyers of raw material: wholesale of other food



8.3. Retail

Purchasing by supermarkets and variety stores, as well as specialised tobacco retailers, appears to be somewhat concentrated (see figure 8.9). Most other retail industries appear un-concentrated on the input side. These patterns have remained little-changed in the period 1995-2003 (see figures 8.10-8.12).

Figure 8.9. Shares of raw material held by 4 and 8 largest buyers of raw material: retail



Note: Grocer’s shops and All-night shops are from 2002, not 2003.

Figure 8.10. Shares of raw material held by 4 largest buyers of raw material: retail of fruit and vegetables, fish, drinks, coffee, and tobacco

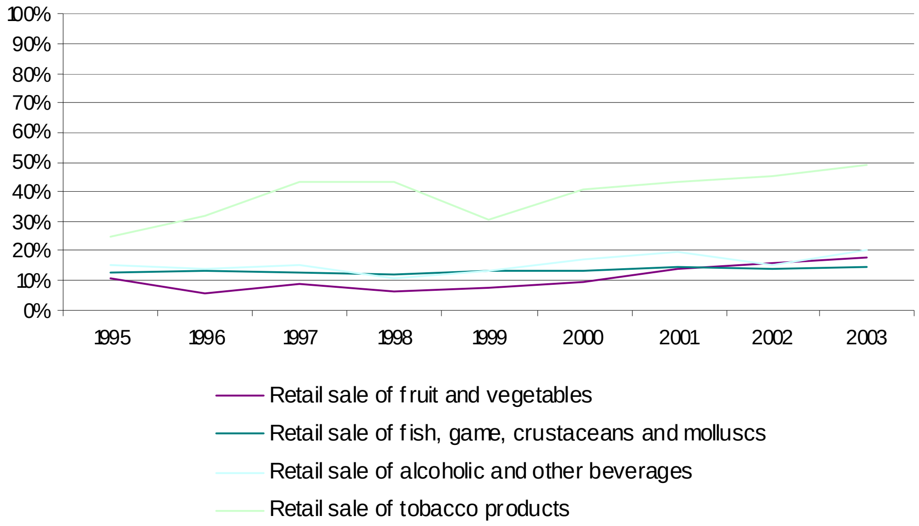
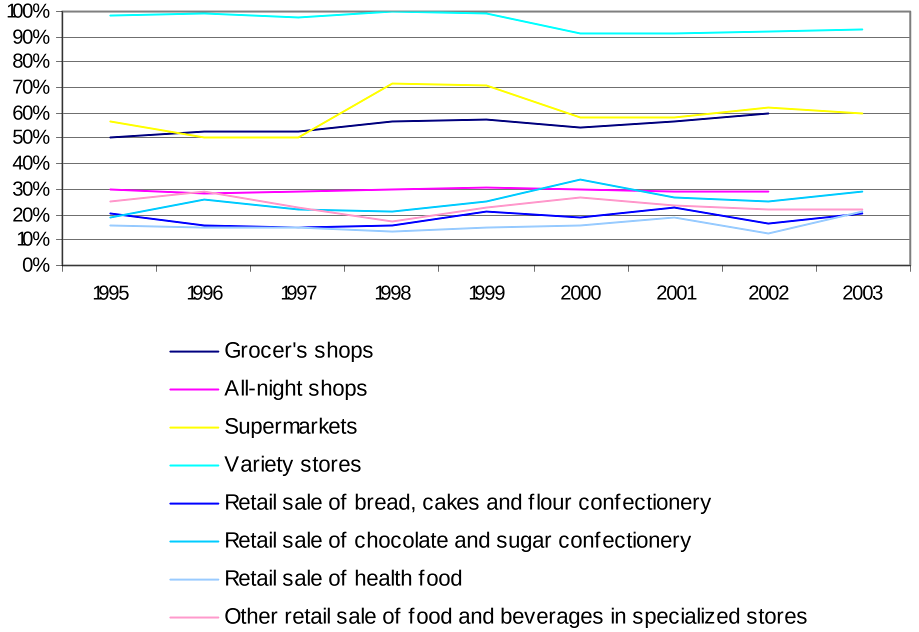


Figure 8.11. Shares of raw material held by 4 largest buyers of raw material: retail of meat and dairy

Figure 8.12. Shares of raw material held by 4 largest buyers of raw material: retail of food



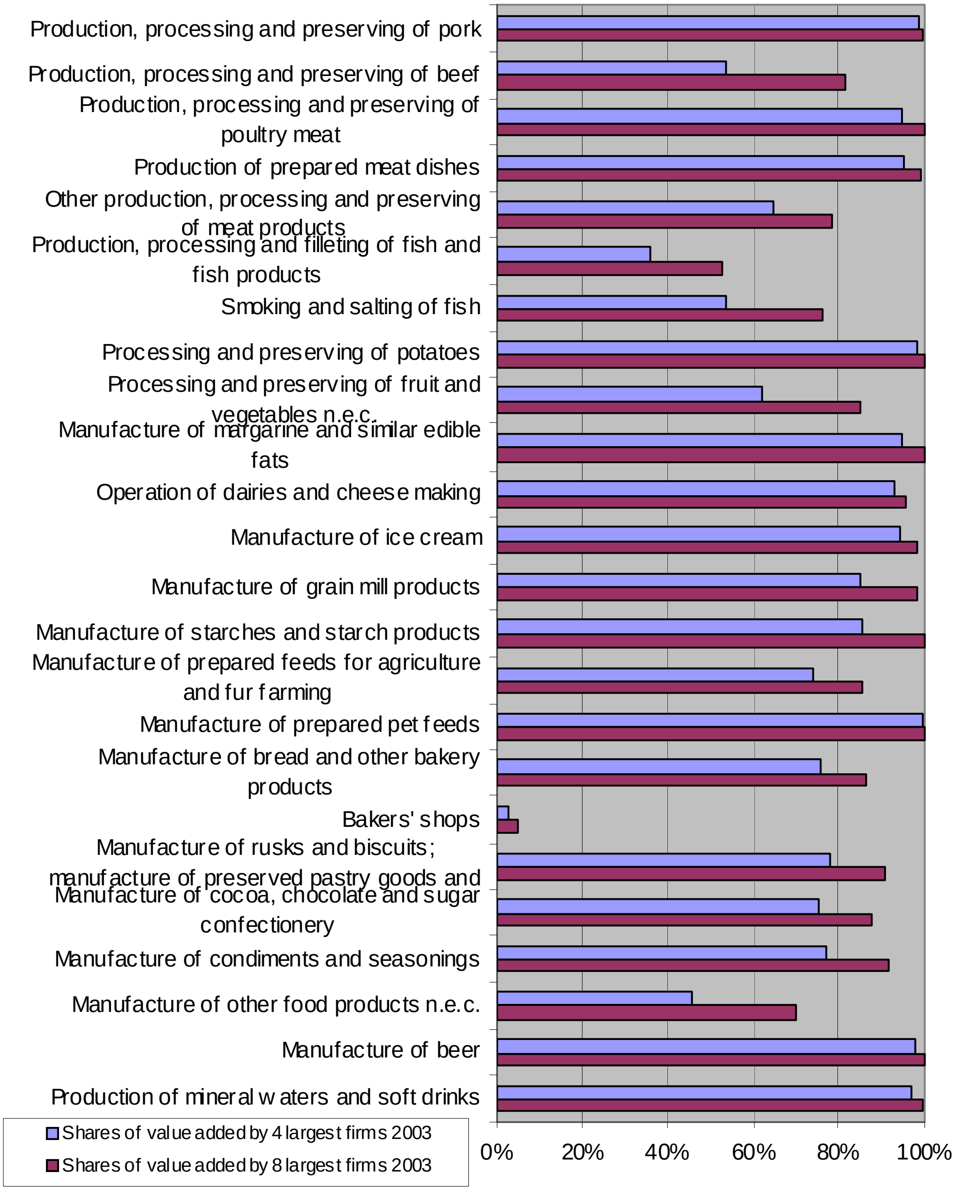
Note: Grocer's shops and All-nights shops 2003 have been deleted as outliers.

9. Distribution of value added

9.1. Processing

The four largest firms (as measured by sales) accumulated over 95% of value added in ten of the 24 food processing industries presented in figure 9.1. In almost all cases, this measure of “value added concentration” exceeds 40%, and notably the difference between top-4 and top-8 is slight in most cases.

Figure 9.1. Shares of value added held by the 4 largest firms by sales



Note: Manufacture of other food products n.e.c. from 2002, not 2003.

Figures 9.2-9.4 demonstrate significant increases in value added concentration for most industries in the period 1995-2003, with the only exception being for beef processing. The increase in value added concentration is particularly pronounced for pork, chicken, feeds, prepared meats and beer manufacturing.

Figure 9.2. Shares of value added held by 4 largest firms by sales: processing of fruit and vegetables, fish, drinks, coffee, and tobacco

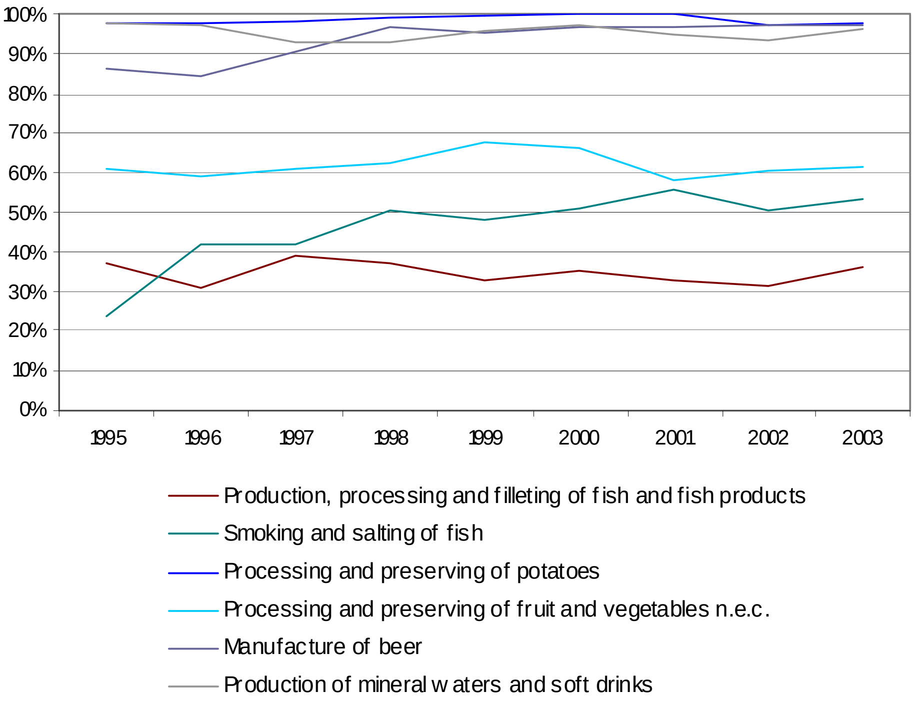


Figure 9.3. Shares of value added held by 4 largest firms by sales: processing of meat and dairy

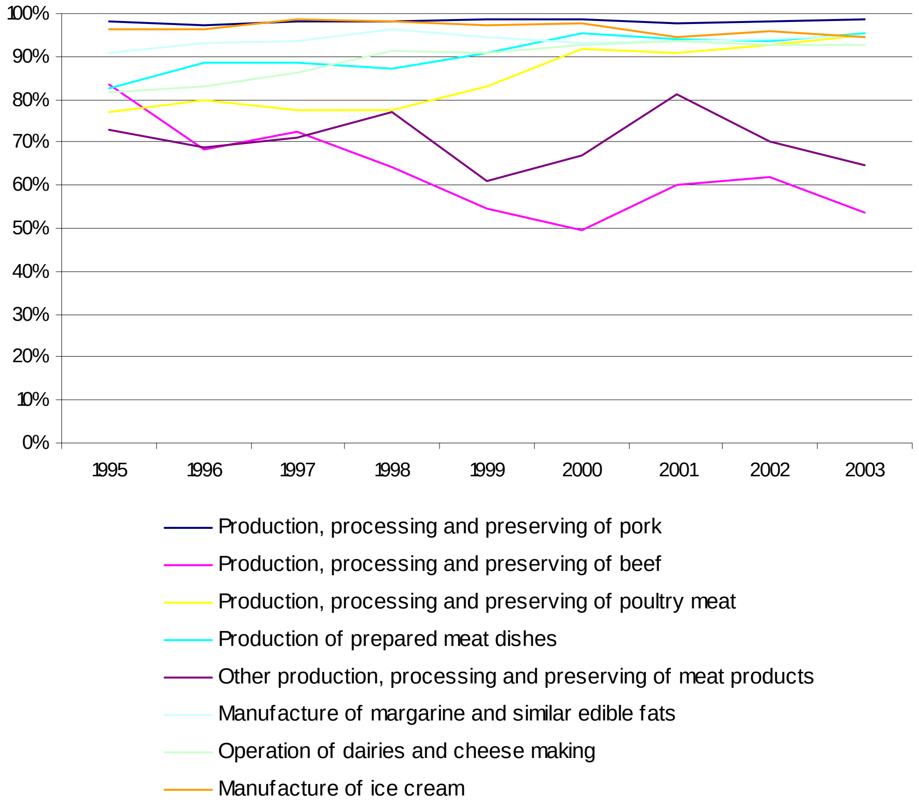
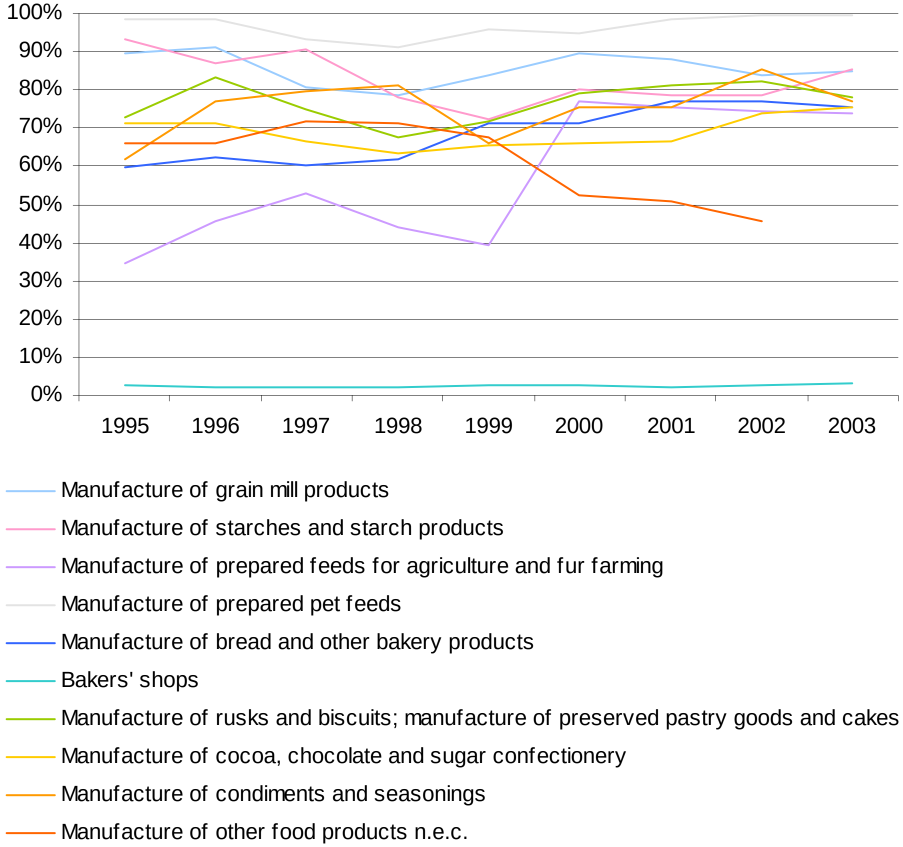


Figure 9.4. Shares of value added held by 4 largest firms by sales: processing of other food



Note: Manufacture of other food products n.e.c. 2003 has been deleted as an outlier.

9.2. Wholesale

The concentration in value added at food wholesale level is substantially lower than that for food processing, across all commodity sectors. Fruits and vegetables and dairy, eggs and oils, and health food products all feature some 60% of value added accruing to the top 4 firms. Notably the top 8 firms account for most of the value added in these industries, and the firms ranked 5-8 together account for significant shares of food wholesale value added. The development of this measure over time (figures 9.6-9.8) features a steady increase in most food wholesale industries, with dairy, eggs and oils and bread and cakes showing substantial increases in value added concentration.

Figure 9.5. Shares value added held by 4 and 8 largest firms by sales: wholesale

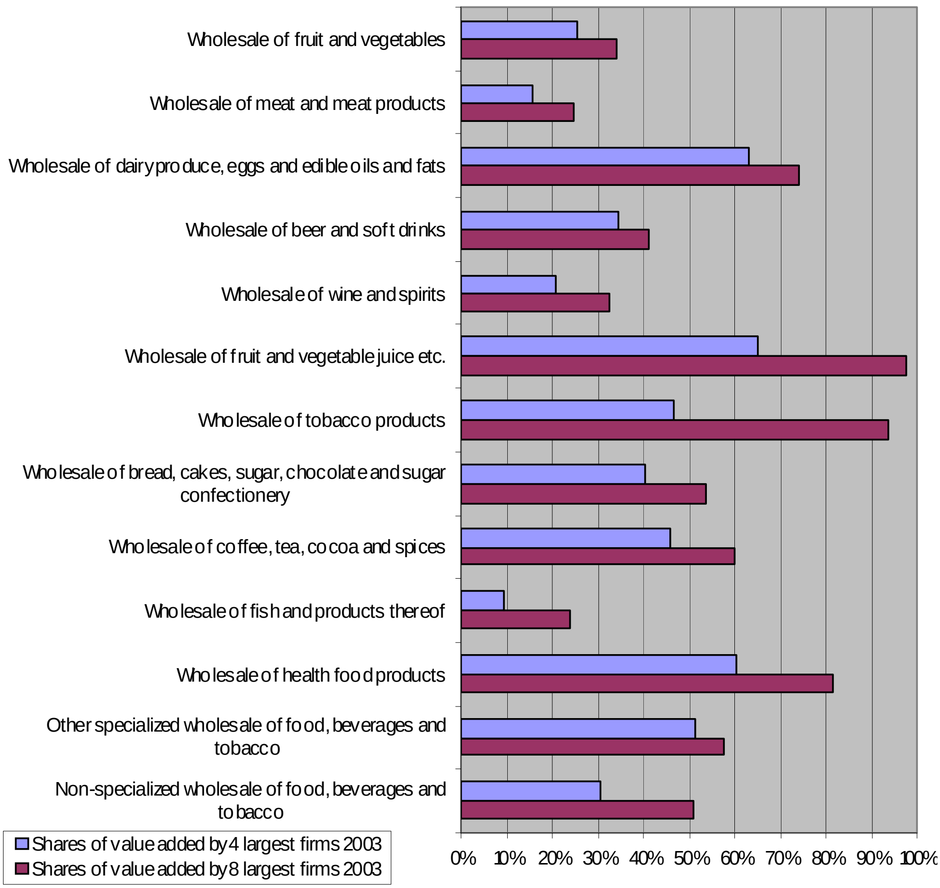


Figure 9.6. Shares of value added held by 4 largest firms by sales: wholesale of fruit and vegetables

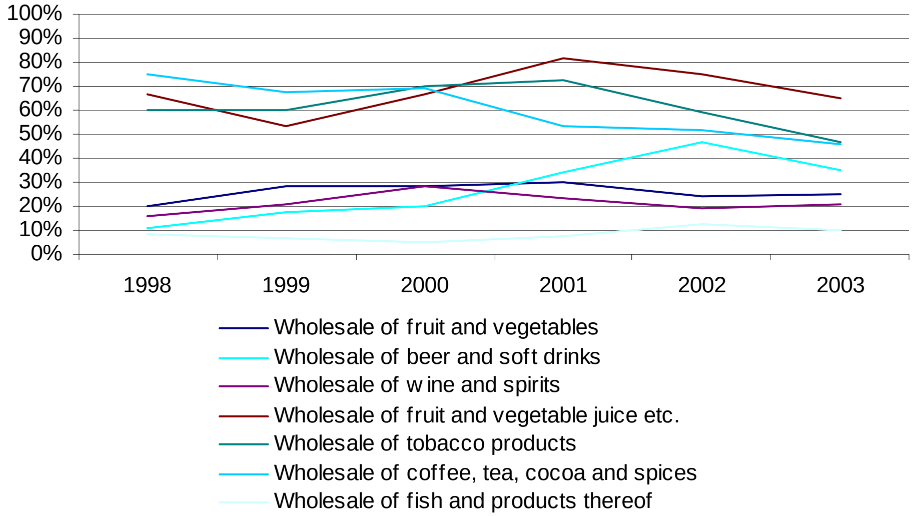


Figure 9.7. Shares of value added held by 4 largest firms by sales: wholesale of meat and dairy

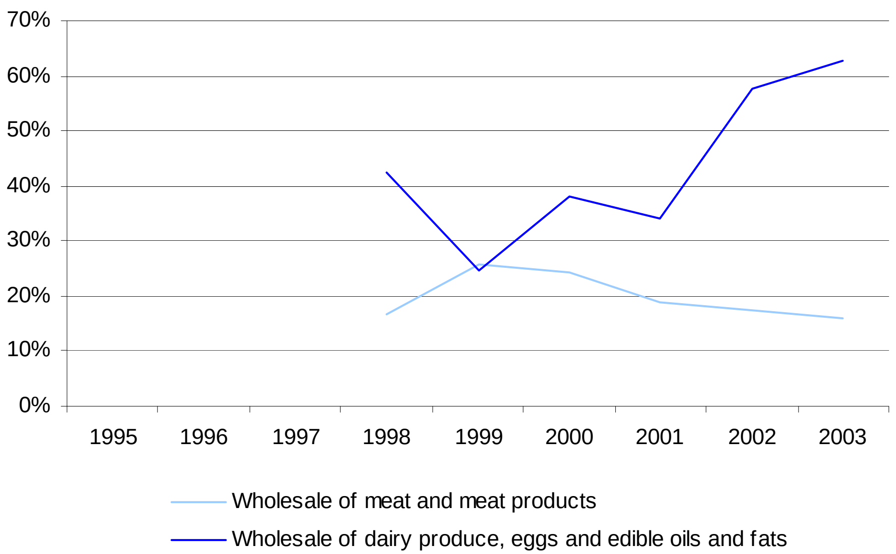
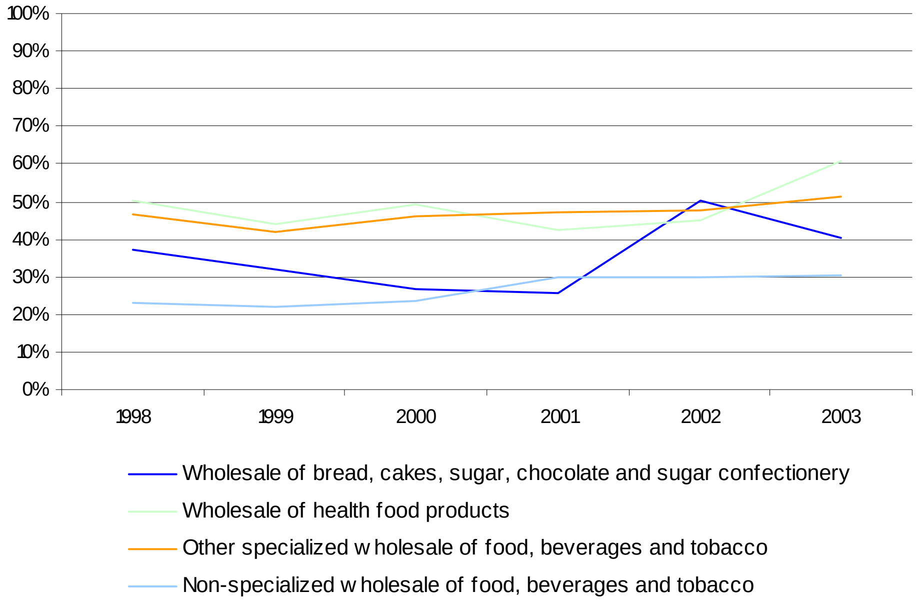


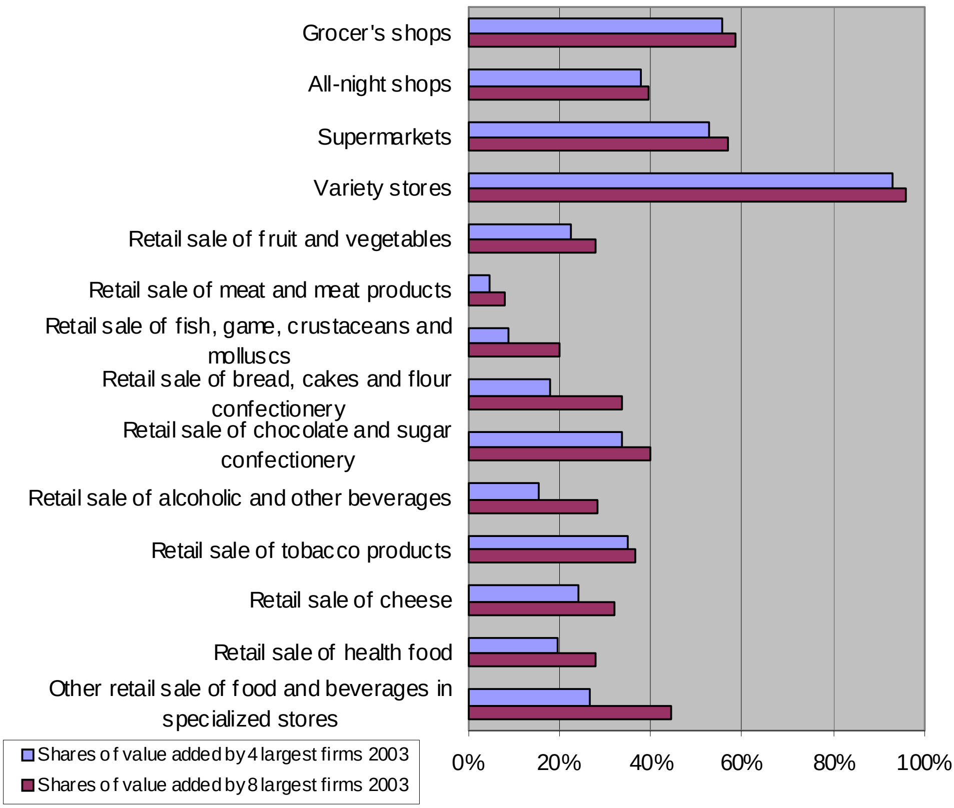
Figure 9.8. Shares of value added held by 4 largest firms by sales: wholesale of other food



9.3. Retail

Figure 9.9 shows that concentration of value added in the food retailing sector is not as extreme as concentration of sales shares. For supermarkets, four firms accumulated 53% of value added in 2003, and for grocers' shops the figure was 43%. Value added received by variety stores appears to be highly concentrated amongst the largest firms. Across all food retail industries, the share of value added held by the firms ranked 5-8 is negligible, indicating the dominance of the largest few firms in each case.

Figure 9.9. Shares value added held by 4 and 8 largest firms by sales: retail



Note: Grocer's shops and All-night shops are from 2002, not 2003.

There are few apparent trends over time (figures 9.10-9.12), and the four largest supermarket firms demonstrate an unexplained fluctuation (between 50 and 70% of value added) in the period 1997-2000. Sales by the top four firms in variety stores and retail bread and cakes sales show some decline in share of value added.

Figure 9.10. Shares of value added held by 4 largest firms by sales: retail of fruit and vegetables, fish, drinks, coffee, and tobacco

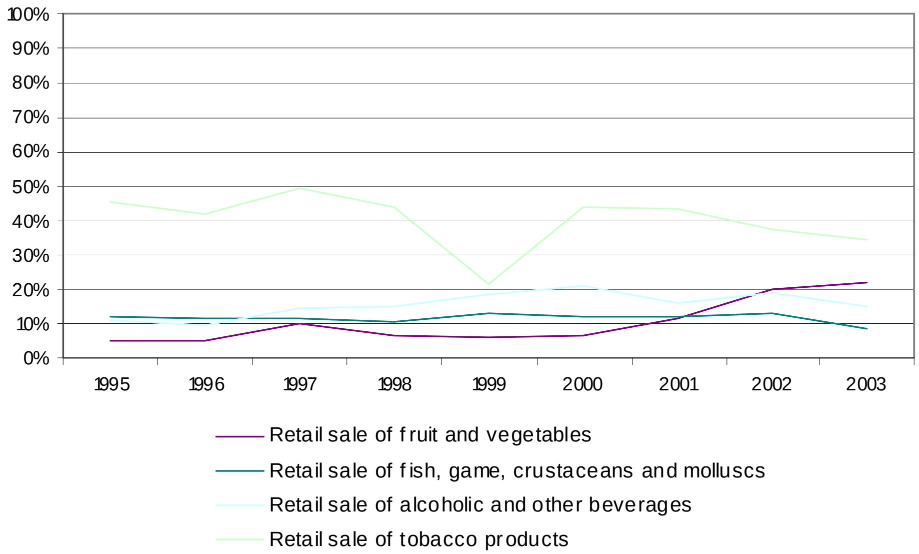


Figure 9.11. Shares of value added held by 4 largest firms by sales: retail of meat and dairy

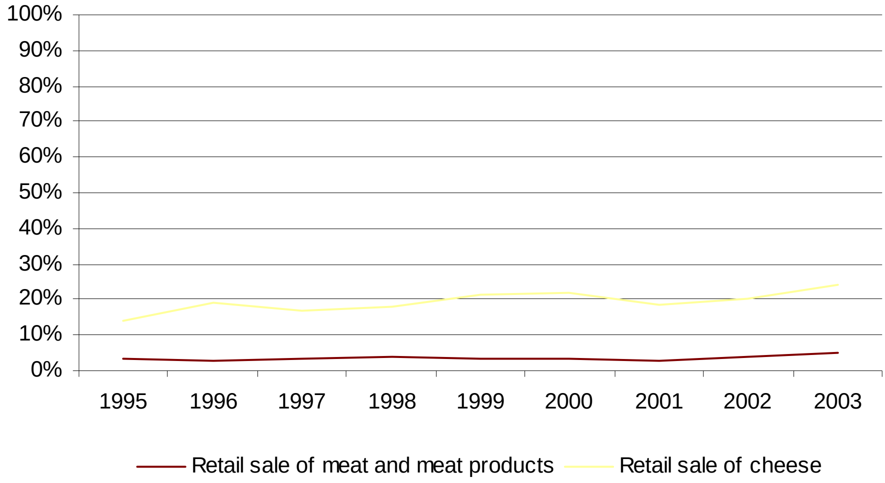
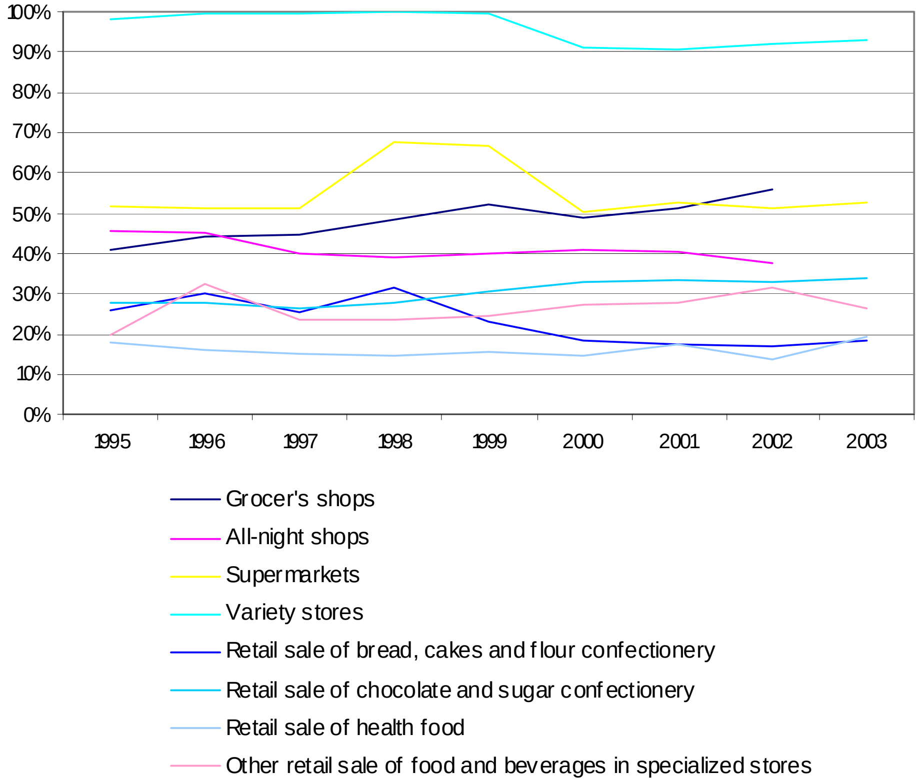


Figure 9.12. Shares of value added held by 4 largest firms by sales: retail of food



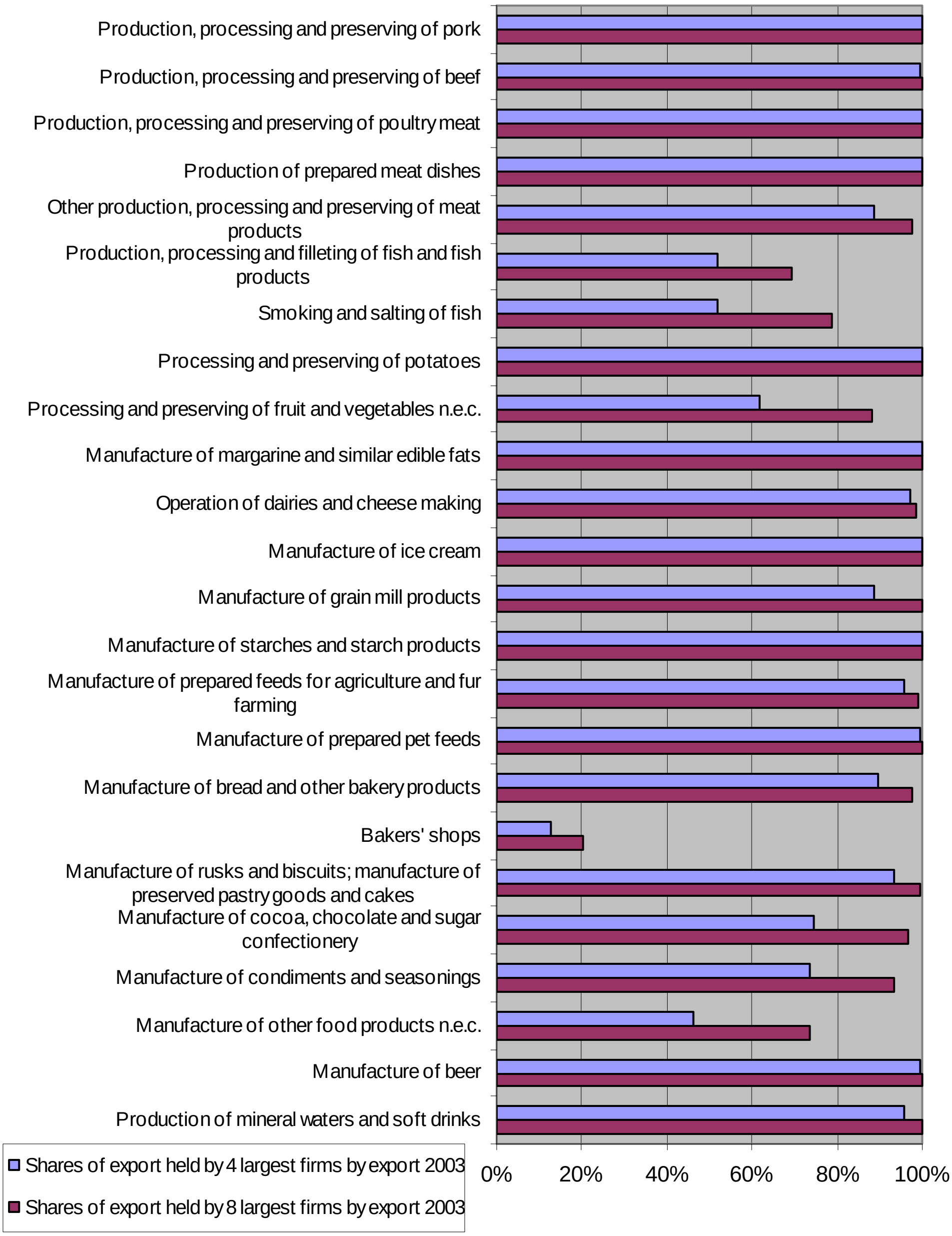
Note: Grocer’s shops and All-night shops 2003 have been deleted as outliers.

10. Concentration in exports

10.1. Processing

Most of the exports from Danish food processing firms come from the four largest exporting firms (see figure 10.1). Only in fish processing industries, and in fruits and vegetables processing do the four largest exporting firms export less than 60% of total industry exports (bakeries are an exception). In the meat, dairy, starch, feeds and beverage industries, the top four exporters are essentially the only exporters.

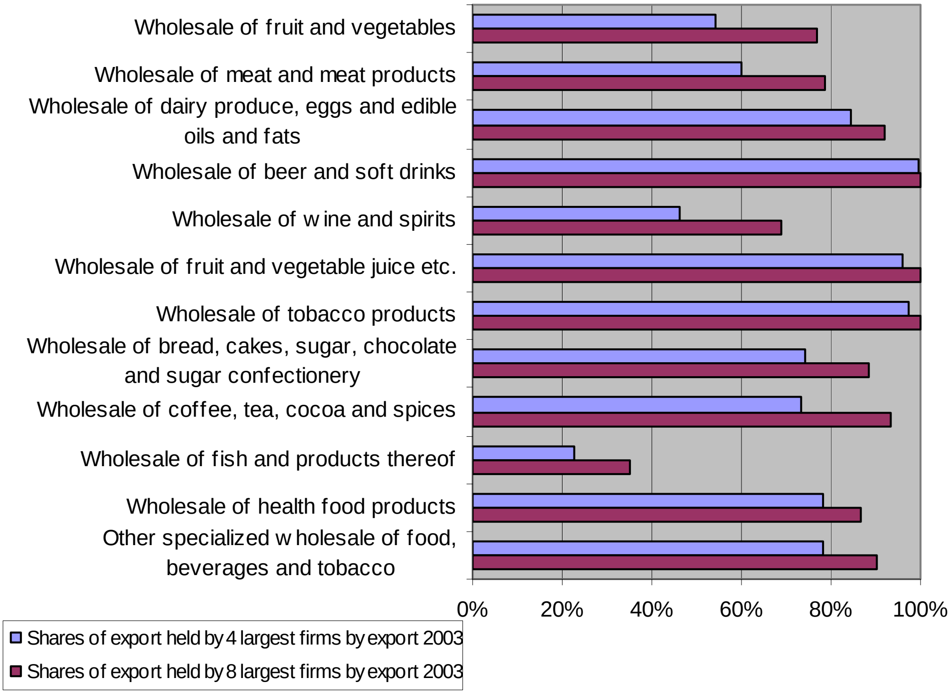
Figure 10.1. Shares of export held by 4 and 8 largest firms by export: processing



10.2. Wholesale

At wholesale level, exports are also dominated by the four largest firms across a range of industries (figure 10.2), albeit not at such extreme levels as for food processing.

Figure 10.2. Shares of export held by 4 and 8 largest firms by export: wholesale



11. Summary and discussion

11.1. Consolidation

There has been widespread consolidation throughout the Danish food sector in the period 1995-2003. The number of food processing firms declined across all industries during both continuous data periods studied here (1995-1998 and 1999-2003), although the largest declines appear to have taken place in the first of those periods as reported in Baker (2003) and indicated by Festerling (2005). Consolidation has been most widespread and extreme in the food wholesale industries, in association with changing supply chain organisation as retailers source more of their products directly.

Almost all food wholesale industries have experienced consolidation, including the major commodity sectors of meat, dairy, brewing and bakery/confectionery. Notable exceptions are health foods and “other specialised” food wholesale, and this result indicates the service of niche markets as proposed by Rogers (2001). The non-specialised food wholesale industry experienced much less consolidation (a 6% decline in the number of firms).

Amongst food retail industries, consolidation was also extreme amongst commodity-specialised retailers such as fruit and vegetable shops, butchers’ shops and chocolate and confectionery shops. Amongst non-specialised retail industries, there has been an expansion of the number of firms operating supermarkets and variety stores, while grocery shops have experienced consolidation.

11.2. Sales

Across Danish food processing, wholesale and retail industries, real sales have been rather static in the period 1995-2003. Aggregate food processing sales rose just 6% in this period, or an average annual increase of less than 1%. For aggregate food wholesaling the figure was a slight decline (less than 1%), and for food retail a slight increase (less than 1%). As a consequence, consolidation in the Danish food industry has resulted in increases in sales per firm: in the period 1999-2003 this averaged 22% at the processing stage, fully 9% at wholesale and 7% at retail. For processing and wholesale, there is a significant correlation coefficient associating industry consolidation with increases in sales per firm.

The largest share of aggregate food processing sales in 2003 was held by pork processing (26.1%), dairy (19.7%), fish (7.3%) and beer (7.1%). The shares held by both dairy and pork processing have increased between 1995 and 2003, while most other industries have seen their share of sales decline. The largest decline in share of sales is for beef processing (down from 3.1% to 1.5%). However, as beef processing is largely carried out by firms active in other meat industries (particularly pork), it is difficult to draw strong conclusions about the implications for beef's development.

In contrast, industries' shares of wholesale sales have changed significantly between 1998 and 2003, with meat wholesalers' share declining from 19.3% to 10.5%, non-specialised wholesale increasing from 30.2% to 35.9%, and a variety of other 1-2 percentage point changes. Shares of sales amongst food retail industries have re-aligned dramatically between 1995 and 2003, with the supermarket industry increasing its share of retail food sales from 29.3% in 1995 to 62.8% in 2003. This has occurred mainly at the expense of grocery and variety stores, as specialised food retail industries' shares of sales were already very small in 1995 and have not changed very much since then: specialised food retail industries held a share of aggregate food retail sales equal to 10.5% in 1995, and this had declined to 8.5% by 2003.

11.3. Value addition

Against a background of static real sales, aggregate real value added rose in the period studied for the great majority of food processing industries, with aggregate food processing value added rising by 20% in the period 1995-2003. Exceptions include ice cream and bakeries, but gains in value added particularly accrued to poultry, dairy and non-alcoholic beverages. The shares of aggregate food processing value added re-aligned to some extent in the period 1995-2003, notably that the pork processing industry fell from 23.8% to 21% of aggregate food processing value added.

At the wholesale stage, aggregate value added was largely unchanged for the period 1998-2003. However, some substantial changes in industry-level shares of value added occurred: meat and meat products' wholesale share of aggregate value added fell from 14.8% to 11.9% while the share of wholesale of dairy, eggs and fats rose from 8.5% to 10.6%. The shares of value added held by commodity-specialised wholesalers was steady for the period studied.

Aggregate value added in food retailing increased 13% from 14.7 to 16.7 billion DKK in the period 1995-2003, with the increases apparently steady and sustained over time.

As is the case for shares of retail food sales, both grocers' shops and supermarkets showed a significant and steady increase in value added over time, but the trend for most other retail industries has been downward. In terms of shares, the supermarket industry has abruptly risen to prominence as its share of aggregate food retail value added rose from 27.6 to 41.2% between 1995 and 2003. Unspecialised retail food industries together accounted for 88% of food retail value added in 2003, which is actually little changed from 1995 (about 82%).

11.4. Concentration in food processing industries

The average 4-firm concentration ratio (CR_4) for food processing industries in 2003 was 46%, and features four industries above 60%. Across the food processing industries, the four largest firms' dominance is even more apparent when expressed in terms of shares of industry sales. For 12 of the 24 food processing industries reported here, the top four firms accounted for 90%, or more, of industry sales. In just four industries (bakeries, fish processing and "other food processing") was this measure less than 50%.

Similar patterns emerge in concentration of raw materials purchases and exports. In general, the top four firms' shares of raw material purchases are higher than their shares of sales, and approach 100% in a number of food processing industries (pork, poultry, potatoes, grain mill products, pet foods, beer and soft drinks). In 14 of 24 food processing industries studied, over 90% of industry exports originated from the four largest firms.

The dominance of the largest food processing firms was also apparent in value addition: the four largest firms account for over 90% of value added in 10 of 24 industries and over 70% in 14 industries. In pork processing, potato processing, pet foods, beer and soft drinks, the top four firms account for almost 100% of value added.

11.5. Concentration in food wholesale industries

Despite the more extreme consolidation in food wholesale industries, relative to food processing, 2003's CR_4 levels are less pronounced. No food wholesaling industry has a CR_4 above 70%, and several key industries (pork, fruit and vegetables, beer and soft drinks) show surprisingly low concentration relative to that shown by food processors. Data on CR_4 are not available for unspecialised food wholesalers.

Use of the cruder measure of industry concentration (share of sales held by the four largest food wholesaling firms) results in some industries appearing more concentrated than is apparent from CR_4 measures. In particular, some 32% of wholesale sales of meat and meat products is held by the top four firms, while the corresponding CR_4 is just 16%. Similar observations apply to dairy and fats, beer and soft drinks, and tobacco.

Concentration in wholesalers' raw material markets is at similar levels to that in their product markets, while exports are rather more concentrated. The top four exporting food wholesale firms account for over 90% of wholesalers' exports of beer and soft drinks, fruit and vegetable juices and tobacco. Notably, the top four fish wholesale exporters hold just 22% of export sales. In the meat and dairy wholesale industries, 60 and 84% of exports are made by the top four firms: these figures far exceed the apparent concentration in domestic wholesale markets for these industries.

In comparison with the food processing industries, value added is less concentrated for food wholesalers. Food wholesale industries' value added is also less concentrated, in general, than is its sales and raw material purchases, which indicates a role for high-value small firms as suggested by Rogers (2001) on US markets. This comment applies to meat and dairy, fruit and vegetables, fish, and unspecialised food wholesale.

11.6. Concentration in food retail industries

Available measures of industry-level concentration at the retail stage of the food marketing chain are less meaningful than those for the other stages because they address primarily sales formats, rather than product markets. CR_4 measures are available only for specialised retail food industries, and these indicate low concentration across most industries, with chocolate and sugar confectionery having the highest at 35%. In general, concentration at industry level appears less concentrated at retail stage than at processing and wholesale.

Based on observed market shares held by the top four firms in each retail food industry, variety stores appear to be the most concentrated (93% of sales held by the top four firms) and supermarkets and grocers shops are also at high levels (59%).

The extent to which value added is concentrated in the hands of the largest firms in each food retailing industry is varied. Although the four largest grocery store firms hold 59% of sales and 60% of raw material purchases, they accrue just 56% of industry value added. A similar relation holds for the four largest firms owning supermarkets (just 53% of industry value added against 56% of market share).

Amongst specialist retail industries, a variety of outcomes for value added concentration is observed. For fish shops, for example, the four largest firms hold 13% of sales but just 9% of value added. For specialist cheese shops, the four largest firms hold 16% of industry sales but 24% of value added, while they purchase just 13% of raw material for that industry.

Table 11.1. Summary of processing developments

Industry	% change in sales per firm 1999-2003	% change in number of firms 1999-2003	CR_4 ratio 2003	% of sales held by top 4 firms by sales 2003	% of VA held by top 4 firms by sales 2003	% of raw material purchases by top 4 buyers 2003	% of exports held by top 4 firms by export 2003
Production, processing and preserving of pork	19%	-13%	65%	98%	99%	98%	100%
Production, processing and preserving of beef	71%	4%	34%	63%	54%	66%	99%
Production, processing and preserving of poultry meat	60%	-27%	66%	95%	95%	95%	100%
Production of prepared meat dishes	13%	0	65%	96%	95%	96%	100%
Other production, processing and preserving of meat products	-20%	0%	41%	61%	65%	58%	89%
Production, processing and filleting of fish and fish products	36%	-20%	13%	47%	36%	51%	52%
Smoking and salting of fish	42%	-8%	21%	49%	53%	50%	52%
Processing and preserving of potatoes	103%	-17%	37%	98%	98%	98%	100%
Processing and preserving of fruit and vegetables n.e.c.	2%	-3%	25%	63%	62%	64%	62%
Manufacture of margarine and similar edible fats	28%	-25%	40%	97%	95%	97%	100%
Operation of dairies and cheese making	27%	-14%	73%	93%	93%	93%	97%
Manufacture of ice cream	67%	18%	76%	94%	94%	92%	100%
Manufacture of grain mill products	4%	-7%	57%	90%	85%	100%	89%
Manufacture of starches and starch products	-14%	-13%	47%	90%	85%	92%	100%
Manufacture of prepared feeds for agriculture and fur farming	506%	-10%	50%	84%	74%	87%	96%
Manufacture of prepared pet feeds	10%	-25%	57%	99%	99%	99%	100%
Manufacture of bread and other bakery products	16%	-5%	62%	77%	76%	74%	89%
Bakeries	3%	-14%	3%	3%	3%	2%	13%
Manufacture of rusks, biscuits and preserved pastry goods	-7%	-23%	51%	82%	78%	86%	93%
Manufacture of cocoa, chocolate and sugar confectionery	-4%	9%	43%	72%	75%	68%	74%
Manufacture of condiments and seasonings	102%	6%	41%	82%	77%	83%	73%
Manufacture of other food products n.e.c.	-29%	44%	30%	48%	45%	54%	46%
Manufacture of beer	-8%	17%	58%	98%	98%	97%	100%
Production of mineral waters and soft drinks	86%	-20%	54%	97%	97%	97%	96%
Average	22%	-11%	46%	79%	78%	80%	84%

Table 11.2. Summary of wholesale developments

Industry	% change in sales per firm 1999-2003	% change in number of firms 1999-2003	CR_4 ratio 2003	% of sales held by top 4 firms by sales 2003	% of VA held by top 4 firms by sales 2003	% of raw material purchases by top 4 buyers 2003	% of exports held by top 4 firms by export 2003
Wholesale of fruit and vegetables	34%	-16%	32%	32%	25%	33%	54%
Wholesale of meat and meat products	-11%	-20%	16%	32%	16%	34%	60%
Wholesale of dairy produce, eggs and edible oils and fats	136%	-14%	61%	75%	63%	76%	84%
Wholesale of beer and soft drinks	138%	-29%	23%	48%	35%	47%	99%
Wholesale of wine and spirits	-11%	-4%	27%	26%	21%	27%	46%
Wholesale of fruit and vegetable juice etc.	-38%	0%	68%	71%	65%	72%	96%
Wholesale of tobacco products	18%	-18%	67%	77%	47%	79%	97%
Wholesale of bread, cakes, sugar, chocolate and sugar confectionery	2%	-22%	43%	38%	41%	38%	74%
Wholesale of coffee, tea, cocoa and spices	-45%	1%	45%	43%	46%	38%	73%
Wholesale of fish and products thereof	-6%	-3%	28%	20%	10%	21%	22%
Wholesale of health food products	-11%	21%	69%	68%	61%	68%	78%
Other specialized wholesale of food, beverages and tobacco	15%	20%	50%	55%	51%	52%	78%
Non-specialized wholesale of food, beverages and tobacco	21%	-6%	na	58%	30%	61%	na
Average	9%	-9%	44%	49%	39%	50%	72%

Table 11.3. Summary of retail developments

Industry	% change in sales per firm 1999-2003	% change in number of firms 1999-2003	CR_4 ratio 2003	% of sales held by top 4 firms by sales 2003	% of VA held by top 4 firms by sales 2003	% of raw material purchases by top 4 buyers 2003
Grocer's shops	28%	-2%	na	59%	56%	60%
All-night shops	-25%	0%	na	30%	38%	29%
Supermarkets	-31%	30%	na	59%	53%	60%
Variety stores	-46%	100%	na	93%	93%	93%
Retail sale of fruit and vegetables	15%	-7%	21%	20%	22%	17%
Retail sale of meat and meat products	-1%	-12%	7%	6%	5%	7%
Retail sale of fish, game, crustaceans and molluscs	-3%	-8%	13%	13%	9%	15%
Retail sale of bread, cakes and flour confectionery	-5%	-22%	19%	19%	18%	20%
Retail sale of chocolate and sugar confectionery	2%	-19%	35%	31%	34%	29%
Retail sale of alcoholic and other beverages	-3%	18%	20%	19%	16%	20%
Retail sale of tobacco products	41%	-30%	23%	46%	35%	49%
Retail sale of cheese	-14%	-9%	19%	16%	24%	13%
Retail sale of health food	26%	8%	20%	20%	19%	21%
Other retail sale of food and beverages in specialized stores	-11%	48%	25%	23%	26%	22%
Average	7%	-5%	20%	30%	30%	27%

Note: Grocer's shops and All-night shops from 2002, not 2003. Except for exports.

12. Discussion

12.1. Implications for industry

The observed generally static food industry sales in the period 1995-2003 are consistent with a mature industry, in which firms pursue value addition and market share rather than sales. From this study it is clear that consolidation is occurring and that this is being accompanied by an increase in industry concentration (as measured in several ways). However, much food processing industry consolidation had already occurred by 2000, and in the period since then food wholesale has seen the biggest adjustment. However, in most food wholesale industries this has not been accompanied by an increase in concentration after about 2000.

By measures of industry-level concentration, retail stage concentration has not changed much during 1995-2003, but supermarkets' share of sales and share of value added has increased enormously. The decline in importance of specialised wholesale and retail identified by Baker (2003) appears to have slowed: at retail level the major changes in shares of sales and value added have involved transfers between unspecialised industries; while at wholesale stage the changes in shares are amongst specialised wholesale industries.

There is evidence that marketing emphases at the different stages clearly differ. Only at retail stage have sales shares changed markedly amongst industries, whereas shares of value added have changed substantially throughout the entire food industry. This indicates that competition is targeting value addition at all stages and both market share and value addition at retail stage. At retail stage, the different industries examined here are effectively sales formats, each of which offers its own food purchase environment to the consumer: some of these are more associated with value addition than others and supermarkets clearly target the convenience of one-stop shopping. Specialised wholesale is increasing its share of sales and value added, while specialised retail maintains a small and declining share of both sales and value added.

This study provides evidence in support of channel development in the Danish food industry. However, this is in terms of apparently high concentration on the "buyer side" at all stages of the chain. If this development has been accompanied by disappearance of wholesale and distribution functions, then this adjustment had largely taken place by about 2000 because wholesale sales, and buyer concentration as measured here, have remained largely constant since that time. Moreover, changes in sales per food wholesale firm, and numbers of those firms, have changed by less than at the processing stage during 1999-2003.

Export as a means of escaping the “mature” Danish market appears to be utilised only by the largest firms, and not by small ones. Conclusions are difficult to draw about changes for small and medium-sized food industry firms, but at processing and retail level the increasing consolidation is associated with large firms dominating value addition and exports. Although there is some evidence of niche market status for small processing firms, large firms are increasingly dominant at wholesale and retail stages. To the extent that specialist commodity-sector knowledge allows value addition, it would appear to be being utilised in association with increases in size, perhaps to take advantage of economies of scale, at the wholesale stage.

12.2. Implications for policymakers

Although this report identifies substantial consolidation and concentration in the Danish food industry, it appears that these developments had largely taken place by the late 1990s. Since that time, it appears that developments have been more concerned with share of value added rather than market share. One consequence of this is that policy directed at concentration is (i) too late to be effective and (ii) not addressing firms’ competitive behaviour.

Having fallen far behind large firms in terms of market share during the 1990s, small and medium-size firms appear to following a similar path in terms of value added and exports, as well as access to raw material. Policies that seek to support small and medium-sized enterprises are then more likely to be more effective by targeting value addition within existing domestic markets and utilising existing (or imported) raw material, than by emphasising exports, market share and vertical arrangements favourable to suppliers. It is likely that large food industry firms exercise economies of scale (Morrison Paul, 2001), so that direct competition between small and large firms places the small ones at a cost disadvantage.

Policies that address value addition must address food industry firms’ fundamental choices over specialisation as opposed to diversified commercial activities. The message from this study is that specialised wholesalers have delivered increased value added over time, while at the retail stage the specialised industries hold minimal shares of both sales and value added. As one example, local products may be favoured as a tool of regional development, but it is questionable whether small firms can be the ones to deliver them through processing and onwards to the consumer or export markets. Similarly, recent studies have shown that Danish organic production is mostly marketed through supermarkets and other major retail outlets (Kledahl, 2006).

Alternative methods and means of sourcing raw materials, in particular, are needed by small firms. Well-established practices have yielded enduring commercial success for Danish co-operatives at processing level, primarily as a cost-effective means of value addition for coalitions of small operators (farmers). The modern context of co-operatives is rather different: they are large agribusiness enterprises, few in number, with large market shares, and in trading relations with an even smaller number of food retailers engaged in cross-border coalitions. Although this study has not directly addressed co-operatives, it raises questions about (i) the sustainability of the existing co-operative model and (ii) the marketing alternatives that remain open for single farmers or small food industry firms.

12.3. Further research

This report invites further research into several key issues affecting food industry structure and performance. First, the measurement of concentration and market power are clearly limited. Improvements are required regarding “buyer power” and the serving of export markets. Beyond measurement, it is of interest to identify activities that large firms may be using to limit entry to export markets, or to marketing channels. These would be of particular interest where they limit the potential of small and medium-sized firms.

Although this report measures trends in value addition and its allocation amongst food industries, it does not address the firm-level aspects of value addition. This is the topic of current work at FOI, where a firm-level study is underway on the same data-set as is used in the current study. Where applied to a study of exports and imports, associated questions about international competitiveness, and Danish firms’ performance, should be addressed.

Separate work under the current project has examined firms’ strategies on market share. The current study indicates that this is probably not a major focus for firms, but value addition is. The various routes to value addition (and particularly various forms of innovation) are deserving of research effort, particularly as they may offer alternatives to small and medium-sized firms. The future of co-operatives in Denmark is also implicated in such research.

No studies have been conducted of imports of raw materials, and complex trading arrangements for semi-finished food products. This may be providing small firms with market access, in preference to the heavily concentrated traditional channels. It is suggested that this topic receive research attention in the future.

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Appendix

The following table defines and explains the variables utilised in this study. The first column lists the internal variable names employed at *Statistics Denmark* and the numbers in the second column refer to the items' position on the original questionnaire.[10] During the period 1995 to 2003, the variable system has been modified and adjusted twice (1999 and 2002), although the changes have been minor. The table refers to the effective version for the years 2002 and 2003. The implemented modifications are explained below.

Table A.1. Description of variables

Variable Name	Position	Explanation
BESK		Number of employees on the payroll in full-time equivalent units.
OMS	1a	Turnover (net sales), excluding discounts, VAT and excise duties.
AUER	1b	Capitalised work performed by the firm itself for own purposes.
ADR	2	Other operating income.
DLG	3	Increase (+) / decrease (-) in stocks (raw materials, finished products etc.)
KRH	4a	Purchases of goods for resale.
KRH	4b	Purchases of raw materials, consumables and packaging materials.
KENE	5	Purchases of energy products (electricity and fuels, excl. for registered motor vehicles).
KLOE	6	Cost of subcontractors and other work done by others on the firm's materials (by non-employees).
UDHL	7	Rent paid (excl. heating bill).
UASI	8	Cost of minor equipment and fixtures not capitalised.
UDVB	9	Payments for temporary workers provided from another enterprise (e.g. agencies).
ULOL	10	Payments for long-term rental and operational leasing of goods.
EKUD	12	Other external charges (excl. secondary).
LGAG	13	Wages and salaries.
ANMI	16	Value adjustments in respect of fixed assets (depreciation charges etc.).
NOAK	17	Value adjustments in respect of current assets (in excess of normal adjustments).
SEUD	18	Other operating charges (of a non-trading type).
GRBY	34	Land and buildings.
ATAM	35	Production machinery and equipment.
AADI	36	Other plant and equipment.

Data for the ordinary write-offs in respect to debtors (OTDE), pension costs (PUDG) and other social security costs (AUDG) have not been available. Concerning the ordinary write-offs, however, the effect is negligible. According to *Statistics Denmark*, it constitutes at most a couple of tenths of a percent of total turnover. The firms' ex-

[10] The currently valid Danish version of the balance questionnaire can be found at http://www.dst.dk/Vejviser/Indberetning/Emneopdelt.aspx?si=11&msi=7

penses for pension and other social security costs have alternatively been calculated as:

$$PUDG + AUDG = \left[\left(\frac{LGAG}{1-x} \right) * 100 \right] - LGAG$$

where x denotes the average fraction of pension and social security costs over total cost of labour (LGAG+PUDG+AUDG) for the food processing, wholesale and retail sector, respectively. The sectoral averages have been provided by *Statistics Denmark* and do not exceed 0.1% of costs.

The above-mentioned modifications concerning the variable system affected the treatment of the so-called residual costs. In general, the residual costs include payments for temporary workers from other enterprises (UDVB), long-term rental and operational leasing of goods (ULOL), ordinary write-offs (OTDE) and other external charges (EKUD). During the period 1995 to 1998, however, the variables EKUD, UDVB and ULOL have been handled as a joint variable named OEEU and during the intermediate period 1999 to 2001, EKUD has been handled together with OTDE under the name ANEU.